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Forest Service

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Environmental Assessment

Pea Prong project

Pleasant Hill Ranger District, Ozark – St. Francis National Forests
Johnson County and Madison County, Arkansas

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SUMMARY

The Ozark National Forest is proposing to manage vegetation to improve forest stands, enhance wildlife habitat, and improve recreational opportunities in the **Pea Prong** project. The actions we are proposing include enhancing wildlife & fish habitat, regeneration cutting as well as thinning timber for biodiversity, forest health, and visual quality, decommissioning roads (some by gating) while improving others, and reducing the build-up of hazardous fuels through prescribed burning. The activities would occur on **federal lands only** in an area bounded by JO 5099 & MA 4795 on the east & south, JO 5051 & MA 4685 on the west, and the National Forest boundary on the north. Activities which are proposed on private land would occur only with the permission of the landowner. The Forest Service will enter into negotiations with those landowners for R.O.W. easements and prescribed burning. The project area falls within Management Areas: Ozark Highlands Trail (2.A.), Mixed Forest (3.C.), High Quality Forest Products (3.E.), and Riparian Corridors (3.I.).

Hardwood stands are recommended for regeneration cutting to perpetuate this forest type and to create a variety of age classes, thereby, promoting diversity; thinning other forest stands is proposed to promote vigor and thriftiness of the remaining trees. Prescribed burning and herbicide/handtool treatments would follow harvesting/thinning of hardwood and pine to: prepare the ground for seedfall or planting, and stimulate wildlife benefits. Timber products in the form of sawlogs, small roundwood, and firewood would be generated by these actions in the near term as well as providing for a future sustainable supply. Fisheries habitat will be enhanced via riparian improvements. Habitat diversity for animals and plants, including threatened, endangered, and/or sensitive species would be maintained or improved by the effects of the timber, wildlife, recreation, and access management. Reduction of wildfire risk by prescribed burning and mechanical fuels reduction is also proposed as well as closing roads no longer needed for land management. This proposal would maintain or improve the plant and animal diversity to meet overall multiple-use objectives as described in the Revised Land and Resource Management Plan.

The proposed action aims to restore ecosystem health and sustainable forest conditions in an area which has been affected by oak decline and exclusion of fire. Vegetative and wildlife diversity would be increased, fuels accumulations would be reduced, forest products would be produced and watershed quality and dispersed recreation quality would be improved in the area.

In addition to the proposed action (alternative 2), the Forest Service also evaluated the following alternatives:

- Alternative 1 – A "No Action" alternative where the present/existing level of management would continue in the analysis area
- Alternative 3 – Same as Alternative 2 but with no broadcast herbicide & a daily burn limit not to exceed 1,500 acres

Based upon the effects of the alternatives, the responsible official will decide which alternative will be selected to best meet the purpose and need identified for this project area. The District Ranger of the Pleasant Hill Ranger District has the authority to make this decision

Part 1 – Introduction

Document Structure

The Forest Service has prepared this Environmental Assessment in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This Environmental Assessment discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. The document is organized into five parts:

- ***Part 1 - Introduction:*** The section includes information on the history of the project proposal, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.
- ***Part 2 - Comparison of Alternatives, including the Proposed Action:*** This section provides a more detailed description of the agency's proposed action as well as alternative methods for achieving the stated purpose. These alternatives were developed based on significant issues raised by the public and other agencies. This discussion also includes possible mitigation measures. Finally, this section provides a summary table of the environmental consequences associated with each alternative.
- ***Part 3 - Environmental Consequences:*** This section describes the environmental effects of implementing the proposed action and other alternatives. This analysis is organized by resources potentially affected. Within each section, the affected environment is described first, followed by the effects of the No Action Alternative that provide a baseline for evaluation and comparison of the other alternatives that follow.
- ***Part 4 - Consultation and Coordination:*** This section provides a list of preparers and agencies consulted during the development of the environmental assessment.
- ***Part 5 - Appendices:*** The appendices provide more detailed information to support the analyses presented in the environmental assessment.

Additional documentation, including more detailed analyses of project-area resources, may be found in the project planning record located at the Pleasant Hill Ranger District Office in Clarksville, Arkansas.

Background

The Pleasant Hill Ranger District's "order of entry" led to this project proposal. The Revised Land and Resources Management Plan (RLRMP-2005) guides activities for a ten to fifteen year planning period and directs that all land types be inventoried within that timeframe. The Pea Prong project area was due for inventory and monitoring. Foremost, this analysis addresses forest health and diversity, as identified by the interdisciplinary team members. This source document is on file at the Pleasant Hill Ranger District office.

Purpose and Need for Action

The purpose of this initiative is to:

1. Restore ecosystem health and sustainable conditions by:
    - Reducing basal area (stand density) and restoring the historic/natural fire regime.
    - Benefit/increase oak regeneration.
    - Increase plant and animal diversity.
    - Reduce fuel loads in order to protect forest ecosystems and private property that are at risk.
    - Improve forest health so that stands are more resistant to stress, insects and other pathogens by reducing overcrowded conditions.
    - Protecting watershed integrity with responsible forest management via vegetation treatments that will ensure continued diversity and vigorous growth while maintaining high water quality.
    - Protecting watershed integrity by closing and decommissioning unneeded roads, thus reducing sedimentation flow into stream channels. Further, riparian stand improvement measures would help ensure flood events are ameliorated by slowing high water and filtering debris and sediment to prevent scouring of streams.
2. Increase habitat potential for early-successional, disturbance-dependent species.
3. Increase Forest visitor safety.
4. Provide forest products to the public.

This action responds to the goals and objectives outlined in the 2005 Ozark-St. Francis National Forests Land and Resources Management Plan (the Revised Forest Plan) for the Mixed Forest Management Area, and helps move the project area toward desired conditions described in that plan. The priorities described in the Forest Plan are as follow:

- Manage for pine and oak woodlands on lower sites.
- Manage for medium density or balanced age-classes on medium to high sites.

This action is needed for the following reasons:

Ecosystem Restoration and Promoting Sustainable Ecosystems

The project area was historically subject to a more frequent regime of vegetation disturbance from anthropogenic fire. This area is within miles of study sites in which frequent fire return intervals have been documented. Here, mean fire-return interval for the period of 1680-1820 ranged from 4.6 to 16 years, for the period of 1821-1880 it ranged from 2 to 3.1 years and for the period of 1881-1920 it ranged from 1.4 to 5 years. From 1921-2000 mean fire-return interval for these study sites ranged from 62-80 years (Guyette and Spetich, 2003). Anthropogenic fire is documented to have played a major role in shaping ecosystem structure in the Ozark Highlands. Documented presence of native peoples in the area prior to the earliest fire scars recorded in this study point to a fire regime with return intervals similar to that documented for the period of 1680-1820. Frequent fire in forest/woodland ecosystems would invariably have produced open, less dense stands with a higher proportion of vegetation adapted to fire. Displacement of anthropogenic fire, creation of barriers to fire

such as roads and a long-standing policy of fire suppression have led to current forest health problems associated with abnormally dense forest conditions and unsustainable ecosystems. Historically, the lands that are now the Ozark – St. Francis National Forest consisted of fire-dependent woodland and forest ecosystems with well-developed herbaceous understories. Currently, the ecosystem in the project area is considered unhealthy because the area lacks these forest conditions. This absence is due to a century of fire suppression and lack of vegetation management. Existing ecological conditions in the project area include dense, overstocked forest, a shift from the historic plant community composition toward fire-intolerant plant species, lack of herbaceous species diversity, and insect epidemics.

General guidance in the LRMP guides the Forest Service to "Respond to land, resource, social and economic changes." Forest health and insect epidemics have become of paramount importance on the Ozark – St Francis within the past few years. A red oak borer epidemic has materialized with affected acreage going from 19,000 acres in 1999 to around 300,000 in 2001. The basic reason for this epidemic can be attributed to excessive forest density resulting in stressed trees. Preliminary field investigations indicate that the red oak component is being reduced by as much as 85% within the affected areas. The Pleasant Hill District is the hardest hit area of the entire forest. It is where the epidemic first started and where evidence of the epidemic still exists. Preventive action is limited, but it is thought the best hope lies in regeneration and thinning (harvest & salvage). This will accomplish two objectives: first, it will reduce inter-tree competition and relieve the water stress on the remaining trees and help them repel some of the borers, and second, the trees that are harvested will be able to begin stump sprouting which will help to provide a source of young oaks for the future. Instigating a prescribed fire rotation mimicking historic (prior to 1920) fire return intervals following thinning/regeneration harvest would maintain open forest conditions with reduced inter-tree competition. The thinning of pine stands is also important in preventing disease attacks from southern pine beetles. These beetles have been spreading across the south in recent years due to the increasingly hot summers and mild winters. Infestations are now common in areas where the beetle was once relatively unknown. South Carolina, North Carolina and Kentucky have had tremendous outbreaks within the last 5 years. Shortleaf pine has been almost completely wiped out on the Daniel Boone National Forest in Kentucky. To date, only small infestations have been observed on the Ozark National Forest (Magazine District), yet southern pine beetles are common to the Ouachita Mountains and southern Arkansas. Once insect infestations start, it is too late to effectively treat large areas and many acres of trees die rapidly. Prevention is the control method of choice by thinning stands to reduce inter-tree competition and relieve moisture stress. By keeping the trees healthy, beetles are expelled from the trees and never reach epidemic proportions.

Watershed integrity is sustained by vegetatively mimicking the natural occurrences of stand manipulation via timber & wildlife management and prescribed fire.

Improve Wildlife Habitat and Benefit Disturbance-Dependent Species through Establishment of Early Seral Habitat.

The Forest provides a wide variety of habitats that supports a diversity of wildlife species. One of the two most important is the early-successional habitat, (0-10 years old). Five of the Management Indicator Species (MIS) from the LRMP are dependent upon early-successional habitat. Two MIS are dependent upon open forest conditions/woodlands.

These disturbance-dependent MIS species population trends have been analyzed utilizing a variety of sources (AGFC 2001, 2006 & 2007, USDA 2001, USDA 2007 and NatureServe 2006). Population monitoring associated with these sources shows the status of these seven species as such:

- Deer populations have generally increased in the last two decades based on harvest data, but there has been a decline the past 3-4 years and it is possible that this reflects a lag time in response to the decline in early seral habitat and/or poor fawn recruitment on the National Forest.
- Black bear populations are increasing; however, to maintain quality habitat over time, there is a need to maintain early-seral habitat.
- Northern bobwhite populations are decreasing due to a lack of pine/oak woodland and native grassland areas.
- Population trends for turkey are stable to declining. This is a result of poor brood recruitment for multiple consecutive years. In addition, downward trends in early-successional habitat would likely produce a negative effect on brood habitat in the future for turkey.
- Prairie warbler populations are decreasing primarily due to lack of young age-class forest (regenerating forest communities).
- Brown-headed nuthatches are dependent upon open pine forest and woodlands. Populations of this species are stable, but available habitat is a limiting factor.
- Red-headed woodpeckers are dependent upon open oak woodlands. Populations of this species are stable to decreasing. Available habitat is a limiting factor.

For the Forest, the amount of early-successional forest habitat increased slightly from 1986 to 1991 to a total of approximately 1.0% forest wide. From 1991 to 2001 early-successional forest habitat declined forest wide to approximately 0.2%. The amount of early-successional habitat on the Forest is tied very closely to the amount of regeneration harvests the Forest conducts in a given year. This type of harvesting has declined over the years and this has driven the decline in early-successional habitat. Currently, the analysis area is comprised of <1% of this early-successional forest habitat.

Hunter (2001) identified species of disturbance-dependent birds which are declining in the central hardwoods area. Forty-three of these species potentially occur within the analysis area. Of these, the United States Fish and Wildlife Service (USDI, 2002) identified 7 of these species as Bird Species of Conservation Concern that are declining in the Central Hardwoods Bird Conservation Region (BCR), and are disturbance-dependent species. These 43 species found within the analysis area would benefit from proposed vegetation treatments due to their reliance upon disturbance-associated habitats (Hunter, et al., 2001).

Reduce Off Highway Vehicle (OHV/ATV) Conflicts with Other Resource Values
Illegal OHV use in the project area (occurring off of designated roads) is causing resource damage and conflicts with other resource uses. Closing and decommissioning roads in the project area will greatly reduce the negative impacts created from illegal OHV use and will thus improve watershed integrity. The new Forest OHV policy designates particular routes on which it is legal to ride on National Forest roads.

Improve Forest Visitor Safety
Red oak borer-caused mortality and associated oak decline have increased the potential for falling trees/limbs to injure forest visitors. Additionally, ice storms within the last several years have created snags, broken tree tops, etc… which pose a threat to visitor safety. Thinning forest stands near recreation areas and implementing associated silvicultural treatments and prescribed fire will reduce potential hazards and improve visitor safety.

Provide Wood Products
Meeting the needs of improving wildlife habitat and promoting sustainable ecosystems will provide timber products to the public over the next few years as a by-product. General guidance in the LRMP directs the Forest Service to protect and improve renewable resource quality while maximizing net public benefits. Specific direction contained in the LRMP guides the Forest Service to "Provide a non-declining yield of forest products consistent with land capability, sustainability, protection needs and other resource values." (LRMP, pp 2-27)

The Proposed Action:

The action proposed by the Forest Service to meet the purpose and need includes several vegetation/habitat management actions. This alternative proposes:

- even-aged management (EAM) on 1,122 acres of hardwood forest (shelterwood)
- thinning on 233 acres of pine and 883 acres of hardwood forest
- timber stand improvement (TSI)/midstory control of hardwood and pine via handtools and herbicide to relieve them from suppressive competition on 1,864 acres (883 ac.=hdwd thinning; 233 ac=pine thinning; 748 ac.=hdwd TSI)
- pre-commercial thinning (PCT) in hardwood, about 36 acres, with herb/hndtls to relieve competition
- pine site preparation (dozer/hydro-axe, herb/hndtl, burn) for planting & release on 30 acres in one stand
- oak woodland thinning on marginal sites, about 660 acres in 12 stands; thinning entails commercial or non-commercial ventures and can be completed using herbicide or handtool methods
- 43 acres of wildlife openings created commercially & mechanically with herb/hndtls, & burning in six areas
- non-native invasive species (NNIS) treatments will occur on as much as 500 acres with herb//hndtls & burning, mostly along roadsides
- riparian stand improvement (RSI) in Lick Branch, Friley Creek, and Pea Prong Creek
- hazardous fuel reduction on 8,608 acres of public land and as much as 2,366 acres of private land
- road maintenance of 22 miles, road reconstruction of 16.1 miles, road decommissioning of approximately 13.3 miles, 7 miles of temporary roading, and installation of up to 6 gates that access the new wildlife openings

These proposed actions have been slightly modified from the original proposed actions that were sent to Interested Citizens and Forest Neighbors in May/June 2012. The table below illustrates the differences in the initially proposed actions and those being proposed now.

Activity	Proposed Initially	Proposed Presently
Road Reconstruction	11 miles	16.1 miles
Road Decommissioning	11 miles	13.3 miles

Decision Framework

Given the purpose and need, the deciding official reviews the proposed action and the other alternatives in order to make the following decisions:

- Which alternative best meets the purpose of this initiative; that is, to guide this project area toward the goals set forth in the Revised Land and Resources Management Plan (RLRMP).
- Which alternative best meets the purpose of the initiative while producing the least adverse cumulative environmental impacts.
- Which alternative best meets the six strategic goals of the Forest Service's 2004 National Strategic Plan.

Public Involvement

The proposal was listed in the Schedule of Proposed Actions in March 2012 until present. It was provided to the public and other agencies for comment during the initial 30-day scoping (comment) period beginning May 30, 2012, and published in the official newspaper of record, The Johnson County ***Graphic*** – (Clarksville, Arkansas). Using the comments from the public, other agencies, and internal comments, the interdisciplinary team developed a list of issues to address.

Issues

The Forest Service separated the issues into two groups: significant and non-significant issues. Significant issues were defined as those directly or indirectly caused by implementing the proposed action. Non-significant issues were identified as those: 1) outside the scope of the proposed action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. The Council on Environmental Quality (CEQ) NEPA regulations require this delineation in Sec. 1501.7, "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)…"

Issues Eliminated From Detailed Study

An issue to use no prescribe burning for hazardous fuel reduction, and wildlife browse production was considered but not developed. Past experience on the district (and confirmed by the latest scientific evidence) has shown that prescribed fire is needed to ensure pine seedlings are established and that adequate wildlife browse be maintained. It has also become increasingly clear that fire plays a major role in the perpetuation of the historic Oak-Hickory-Shortleaf pine forest of the Ozark Mountains.

Issues Studied in Detail

As for significant issues, the Forest Service identified two topics raised during scoping and/or ID Team meetings. These issues include:

Issue #1

The cumulative effects of herbicide use on water quality, especially foliar spraying and its likelihood of entering nearby streams and local water supplies.

The measurement indicator for this issue is: acres of planned foliar application of herbicide.

Issue #2

The effects of prescribed burning on air quality.

The measurement indicator for this issue is: acres of public land (and private land) Rx burned for fuel reduction, oak restoration, and wildlife/vegetation diversity.

The issues addressed in this Environmental Assessment involve contrasts among optional uses of available forest resources. Once analyzed, they were then used by the team to develop project alternatives. All proposals within this EA meet all conditions of the Revised LRMP and Amendments and other applicable State and Federal Laws and Regulations.

Part 2 - Comparison of Alternatives

This chapter describes and compares the alternatives considered for the Pea Prong project. It includes a description and map of each alternative considered. This section also presents the alternatives in comparison form, defining the differences between them and providing a clear basis for choice by the decision maker and the public. Some of the information used to compare the alternatives can be based upon the extent of the alternative (for example, the amount of prescribed burning, i.e.-acres) and some of the information is based upon the environmental, social and economic effects of implementing each alternative (for example, the amount of erosion (tons) or the degree of risk (%) to public safety).

Alternatives

ALTERNATIVE 1

No Action

Under the No Action alternative for this project proposal, current management plans would continue to guide administration of the project area. Custodial administration would proceed; however, in-depth, substantive resource management would not be accomplished… with the following consequences:

- Wildlife species needing early-seral habitat would decline.
- In all likelihood, Oak Decline (insect & disease) symptoms would continue unchecked for the foreseeable future.
- Reintroduction of fire disturbance regimes into fire-adapted ecosystems would not occur.
- The forest would continue to age, which may further exacerbate conditions favorable to insect and disease occurrences. A well-distributed mix of age-classes across the landscape is healthier and can more vigorously repel these attacks.
- Vegetative diversity and quality wildlife browse would suffer due to more closed-canopy conditions. Loss of grasses and forbs will reduce populations of small mammals, insect/seed-eating birds, and larger game animals such as turkey and deer.
- Critical levels of fuel such as leaf litter, needle-duff layers, and fallen timber will continue to accumulate, increasing the threat of destructive wildfire occurrence.
- Available water on a dispersed basis for wildlife needs would not be met according to LRMP standards.
- Wood products and revenue that help sustain the local economy would not be generated.
- Air quality would remain good; water quality could potentially decrease as natural sedimentation of unstable roads would continue to occur through bank/sheet erosion during heavy rain events.
- Recreation opportunities will remain enjoyable, although visual penetration into the forest by recreational motorists may decline, especially during the summer. Hunting may be negatively impacted as well as observing wildlife due to closed-canopy conditions. Opportunities to upgrade and stabilize the transportation system within the project area would be prolonged.
- Unstable roads will continue to contribute sediment to water sources.
- Threatened and endangered species that depend upon disturbance (e.g., fire) may decrease.
- Fish habitat improvements would be delayed or postponed.

ALTERNATIVE 2

The Proposed Action

Hardwood Shelterwood followed by Site Prep Herbicide & Burning would occur on 1,122 acres. This treatment would sustain long-term forest health, provide for the succession of early-seral habitat, and contribute to providing a sustainable forest. These stands are mature; growth has slowed and the trees are beginning to decline. The objective of a shelterwood is to open up the stand allowing sunlight to reach the forest floor while leaving an adequate amount of trees to provide seed. As the name implies, several trees would be left in the overstory to give shelter to the developing regeneration on the ground. The mature hardwood left over from the harvests will remain until the new stands receive their first thinning. The combination of stump/root sprouts from oak species and the other existing desirable seedlings will establish the new stands. An average basal area of 20-40 ft^2 would be retained.

After harvest, these stands will have herbicide applied to undesirable stems by the hack and squirt and foliar methods, then site prep burned to prepare the site for seedfall. If oak species adequately replenish the new stands by natural means, **release** measures may be implemented using handtools/herbicide, if necessary, to reduce competing vegetation. This would occur within 2-5 years after harvest. If desired species fail to adequately establish new stands, **planting & release** of oak species will be required.

Hardwood Pre-commercial Thinning (PCT) with handtools/herbicide would occur on 2 stands (36 acres). This is a treatment used in stands that are not commercially mature. The purpose of PCT would be to remove small, unmerchantable trees that are competing with desired hardwood species. This treatment would allow for the selection of the trees with the best form to remain and to free them of competition. Prescribed burning may follow this treatment to further control unwanted competitors of oak.

Hardwood Timber Stand Improvement (TSI) - Midstory Treatment by Herbicide would occur on 748 acres (13 stands). These stands are mostly immature sawtimber but do have a component of mature trees; they have a dense midstory and understory of undesirable species. Removal of these undesirable species will allow oak and other desirable species currently in and underneath the midstory to be released and become competitive. The success of this treatment would allow a regeneration harvest to be considered next entry. Prescribed burning may follow this treatment to further control unwanted competitors of oak.

Oak Woodland Thinning is proposed on 12 stands, about 660 acres. These stands are situated on marginally productive soils. They will be thinned, either commercially or otherwise, to a 40 ft^2 density and maintained throughout most of its 150-year life span at this spacing. At age 150, the trees will, ideally, be commercially harvested via the shelterwood method. A pool of advanced oak regeneration should be in place by the time the overstory is removed. Rx burning will be done on a 3-5 year return-interval until age 150, at which time burning will halt to allow oak seedlings to become firmly established. Thinning during this 150-year rotation can be done either commercially or non-commercially, and can be accomplished by handtool or herbicide means, too. Stands along good access roads can be thinned by firewood sales.

Pine and Hardwood Thinning followed by TSI - Midstory Control would occur on 233 acres (12 stands) of pine and 883 acres of hardwood (20 stands). Thinning would increase growth of residual trees, reduce the susceptibility of the stand to insect and disease, and improve habitat for wildlife. The stands would be thinned to a target basal area of 60-70 ft^2/acre. Trees that are suppressed or that have poor form would be removed. Trees of good form and/or close to the correct spacing would be favored over trees that are simply of larger size. The target spacing would depend on the average diameter of the trees in the stand. Prescribed burning following thinning would provide beneficial effects for wildlife. TSI treatments of the midstory using herbicide and/or handtools may be utilized to further reduce competition of the remaining trees.

Pine Heavy Site Preparation, Planting, and Release are recommended in one stand, approximately 30 acres. This stand was harvested about forty years ago to promote rangeland for cattle. Later, it was planted to pine seedlings, but failed. Now, it has grown up into hardwood brush and trees that will require heavy site preparation measures through mechanical and herbicide methods. After site preparation, planting with pine seedlings is recommended. Subsequent treatments of release will be needed to ensure pine seedlings survive to fully stock the stand.

Wildlife & Fishery Habitat Improvement

New Permanent Wildlife Openings (New Construction)
Openings will be constructed in forest stands (where applicable) by timber harvest, then by dozing & burning, herbicide application, seeding, liming and fertilization. Once constructed, the openings will be disked and seeded with either cool season or warm season grass/forb seed mixtures. Native shrubs may be planted in them or along their edges. Short access roads associated with wildlife openings would be gated.

Openings will be maintained with brush hogging, burning, herbicide application and seeding/fertilizing on an approximate 2-year rotation.

Riparian Stand Improvement (RSI) along streams: is recommended to reduce flood velocities by recruiting larger trees into this zone. These trees will eventually fall in place; others will be cut and left where they are and some will be cut to fall into the streambed. Slowing water velocity will allow fine material to drop out during floods, which will increase soil productivity. It would increase the potential for this wood laying in the floodplain to be imported into the actual channel. This would expand the amount of habitat for small mammals, reptiles, and amphibians in the riparian area. RSI would occur in these streams and their tributaries: Lick Branch, Pea Prong, and Friley Creek.

Table 1. Alternative 2 - Forest Vegetation Management by Stand

Treatment	Compt.	Stand	Acres	Connected Actions
Pine Thinning	460	3	25	Midstory control (TSI)with herbicide/handtools; WL Burn
		9	23	"
		21	14	"
		25	18	"
	461	7	5	"
		9	7	"
	462	9	7	"
		12	19	"
		14	38	"
		26	7	"
	488	19	9	"
	494	1	61	"
TOTAL		**12 stands**	**233 acres**	
Hdwd Thinning (only)	461	14	53	Midstory control (TSI)with herbicide/handtools; WL Burn
	462	1	28	"
		3	35	"
		15	14	"
		21	83	"
		22	61	"
		23	63	"
		24	48	"
		25	44	"
	495	11	101	"
	667	2	208	"
TOTAL		**11 stands**	**738 acres**	

Treatment	Compt	Stand	Acres	Acres	Connected Actions
Hdwd Shltwd & Thinning			Shelterwood	Thinning	Site prep: handtl/herb/mech, burn, release 2-5 yrs.
	460	16	60	12	in the shltwd areas; thinned areas will have mid-
	462	7	50	14	story control w/herb/hndtl means w/burning.
		19	90	26	
	487	2	30	19	
		12	60	27	
		16	30	12	
		22	30	9	145 ac. thinning is to be TSI'd along with 233 ac.=
	495	5	120	15	Pine thin; 738 ac.=hdwd thin; 748 ac.= hdwd TSI;
	667	7	90	13	Totaling 1,864 acres of TSI.
TOTAL		**9 stands**	**560 acres**	**145 acres**	

Treatment	Compt.	Stand	Acres	Connected Actions
Hdwd Shltrwd (only)	461	2	27	Site prep: handtl/herb/mech, burn, release 2-5 yrs.
		10	42	"
		12	17	"
		38	31	"
	462	6	48	"
		11	34	"
	487	20	30	"
	488	3	36	"
		4	20	"
		16	38	"
		35	19	"
	494	23	36	"
	495	8	40	"
		11	25	"
		16	18	"
		18	27	"
	667	6	31	"
		11	43	
TOTAL		**18 stands**	**562 acres**	

Table 1. Alternative 2 - Forest Vegetation Management by Stand (cont'd)

Treatment	Compt.	Stand	Acres	Connected Actions
Hdwd TSI	460	7	106	Midstory control with herbicide/handtools; Burn
		16	39	"
	487	4	57	"
		5	28	"
		7	44	"
		14	99	"
		17	37	"
		19	73	"
		21	51	"
	488	8	52	"
		15	50	"
		21	87	"
		38	25	"
TOTAL		**13 stands**	**748 acres**	
Woodland Thinning (hdwd)	461	8	13	Burning (CUS-control of understory)
		11	26	"
		17	35	"
	462	2	24	"
	487	3	51	"
	488	10	43	"
		24	148	"
		25	63	"
		31	9	"
		36	100	"
	494	3	93	"
	495	3	56	"
TOTAL		**12 stands**	**661 acres**	
Hdwd Pre-Commercial Thin (PCT)	462	10	30	Burning
		13	6	"
		2 stands	**36 acres**	
Wildlife Opening Construction	462	1,2,3,7,11,12,14	16	Dozer/hydro-axe, herb/handtl, burn
	487	19, 25	5	"
	488	6	22	"
TOTAL		**10 stands**	**43 acres**	
NNIS Control	ALL	ALL	≤500	Handtool/herb., burn
Pine- heavy site preparation for planting	667	1	30	Herb/handtl/mech, burn

Prescribed Fire and Mechanical Fuels Reduction

Prescribed fire and/or Mechanical Fuels reduction may occur on up to approximately 8,608 acres of federal lands within the Pea Prong project area. Prescribed fire treatments may occur on private lands located within the project area (approx. 2,366 ac.), but only after consultation with landowners and a prescribed fire agreement under the Wyden Amendment (Section 334(a) of Public Law 105-83) and/or Stevens agreements in cooperation with the Arkansas State Forestry Commission. Should agreements with private landowners be signed, private lands would be burned under prescription in conjunction with prescribed burns on public lands.

Prescribed fire would be utilized for several purposes in the project area in both the dormant and growing seasons. Prescribed fire would serve to re-introduce fire into a fire-adapted ecosystem, promote oak regeneration in canopy openings created by red oak borer damage/oak decline, promote regeneration in shelterwood and seedtree harvest areas, maintain pine/hardwood stands in open conditions, increase herbaceous understory species density and diversity, improve habitat conditions for fire-dependent special-status plants, increase soft-mast production and reduce potentially hazardous accumulations of fuels on the forest floor, and

improve wildlife habitat conditions. Prescribed burning may be done on a 3-10 year rotation throughout the Pea Prong project area in Management Areas 2.A., 3.C. and 3.E.

Roadwork

Decommissioning: The transportation system in this project has been assessed to determine the need for closing roads no longer needed for land management. Roads (approximately 13.3 miles) to be decommissioned and closed with gates are displayed on the GIS maps associated with this project proposal.

Road Decommissioning is defined by 36 CFR 212.1 as activities that result in the stabilization and restoration of unneeded roads to a more natural state. Several of these roads currently traverse natural fluvial systems and concentrations of water may result in possible resource damage. Priorities for decommissioning these roads include access, drainage, stability, erosion, and re-vegetation. These roads will be removed from the transportation system.

Maintenance & Reconstruction: to access the project area and implement vegetation management, roadwork would be necessary and consist of (approximately) maintaining 21.81 miles of existing Forest Service roads and reconstructing 16.1 miles.

Roads designated as temporary roads would be blocked following completion of use, and rehabilitated with seeding and/or natural re-vegetation. Closed temporary roads would be managed as linear herbaceous strips for wildlife in appropriate locations. The number of temporary roads would total approximately 7 miles. Temporary roads are not intended to be included as part of the forest road atlas, as they are managed for projects or activities, then decommissioned after use. Roads to be maintained are displayed on the GIS maps associated with this project proposal. The Roads Analysis Process (RAP) for this project describes all road decommissioning, closures and traffic levels. Closures are evaluated as to what type will be used; whether they will be closed with gates, earthen mounds, or other means. Illegal, "renegade" OHV trails would be closed with earthen mounds or gates.

When administrative activities are complete and a forest system road is no longer needed for one or more years, they are closed for resource protection and to improve watershed integrity. Gating has proven to be a more effective method of eliminating illegal motorized vehicle use. Closure denotes storage for future use; the road remains on the forest development transportation system and periodic maintenance may be required.

Roads that are currently closed or sections of roads would be open to administrative use only and closed with gates/berms after they are no longer needed.

Table 2. Alternative 2 - Summary of Roadwork – Pea Prong

Road No.	Decom. Miles	Decom. Reason	Const. Miles	Recon. Miles	Maint. miles	Remarks / Mgmt Priority
94460A				0.39		
94460B	0.34	Not needed				Return to general forest area for resource protection
94460C	0.61	Not needed				Return to general forest area for resource protection
94461A				0.43	0.29	
94461B	0.49	Not needed		1.58		Return to general forest area for resource protection
94462A				2.45		
94462B	0.38	Not needed				Return to general forest area for resource protection
94462D	0.92	Not needed				“
94462E	0.20	Not needed				“
94462F	0.11	Not needed				“
94462H	0.53	Not needed			0.07	
94487A					0.31	
94488A				1.0		
94488B					0.38	
94494A					0.19	
94495A				0.71		
94495B	0.72	Not needed		0.41		
94667A				0.84		
1497/1540(new)	1.21	Not needed			8.67	
1508B	0.32	Not needed		1.81		
1526	4.62	Not needed		0.52	0.39	
1526A	2.1	Not needed				Return to general forest area for resource protection
1540				5.78		
1540A	0.75	Not needed		0.18	0.54	
JO 5099					6.22	
MA 4600					0.56	
MA 4685					1.81	
MA 4795					2.38	
	13.3			**16.1**	**21.81**	

Existing Special Uses and Rights-of-Way Needs

Six road Rights-of-Way (ROW) needs have been identified within the project area. They are needed for present/future management activities and are as follows:

Section 15, Township 13 North; Range 25 West, FS 94495A
Section(s) 21 & 28, Township 13 North; Range 25 West, FS 94488A & 1508B (3 ROW's)
Section 34, Township 13 North, Range 25 West, FS 1526
Section 3 & 4, Township 12 North, Range 25 West, FS 1540A & FS 1526

The road system and overall forest system lands within the analysis area are compatible with the management of special uses. A review of private in-holdings and recreational opportunities within the analysis area shows it to be fairly likely that the Forest Service will receive additional special use proposals in the future. This is based on the existing private in-holdings within the analysis area. There has also been a temporary special use permit issued here in the last 3 years. It was issued authorizing commercial hauling of timber across National Forest land from private property.

No other types of permits are on file at this time. Proposed projects within the analysis area will not affect any permitted uses currently or in the future. If road closures occur resulting from various actions taken within the analysis area and a private landowner determines they are in need of legal access, proper procedures for permitting the access shall be followed.

ALTERNATIVE 3

No Foliar Herbicide; Daily Burn Limit not to Exceed 1500 Acres

This alternative is identical to Alternative 2, using the same acreages for timber and wildlife and cultural treatments. Its only difference from Alternative 2 (the proposed action) is the daily limit for prescribed burning that would not exceed 1500 acres per day. Additionally, there would be no foliar or broadcast herbicide use for this alternative. This alternative was developed in response to public comments which relate to the use of prescribed fire and herbicides, and its perceived effects upon the environment and human health. Prescribed fire would be utilized for the purposes of fuel reduction, silvicultural treatment, and wildlife habitat improvement in stands, but only in 1500-acre increments. Herbicide use would only entail direct-stem injection of the trees targeted for removal or direct-stump application after the trees are sawn down. Foliar spraying would be prohibited, and would need to be replaced with a handtool operation. Generally, handtools are not as effective for vegetation manipulation as herbicides; therefore, more handtool applications may be required in this alternative.

With implementation of Alternative 3, the same number of acres in the proposed action could potentially be burned; however, the District would be limited to 1500 acres per day, thereby reducing smoke output. Consequently, the District may have to burn more days because smaller areas would be burned. Burning larger land areas generally reduce the number of days needed to burn. Because natural barriers, such as ephemeral/perennial streams and man-made barriers such as roads and pastures as fire-breaks wouldn't always be available for use when burning the proposed smaller blocks of land, approximately 5 miles of additional dozer line would need to be constructed. However, if consent is given from private land-owners to burn off Forest land, some man-made barriers such as roads and pastures could be used as fire-breaks and could possibly reduce the amount of fire-line needed to be constructed. With implementation of Alternative 3, all other potential management actions would be the same as those described for Alternative 2.

Forest-Wide Standards

In order to protect the environment and lessen possible negative impacts, the following Standards will be applied to the proposed alternatives. Management Requirements of the Revised Ozark-St. Francis National Forests Land and Resources Management Plan will apply as standard mitigating measures to all proposed activities. Best Management Practices (BMP) Guidelines for Silviculture Activities in Arkansas will also apply as standard mitigation measures for all proposed actions.

The following is a summary of the specific mitigating measures:

1. GENERAL

a. A biological evaluation has been conducted on all areas proposed for management activities. The list of the species surveyed for is in the project file. Any PETS that are found will be protected (FSM 2670.31).

b. Soil productivity will be protected by discing, seeding, and fertilizing haul roads, firelines, and temporary roads.

c. Water quality will be protected by retaining filter strips of vegetation along all perennial streams/springs and defined stream channels. This zone will be 100-150 feet on either side of the perennial streams and 50-100 feet on either side of defined channels; at least 50 square feet of basal area will be retained within each zone. No vegetation will be removed within 20 feet of the bank of a perennial stream and 5 feet of a defined channel (LRMP pp. 3-12).

   The Arkansas Forestry Commission's Best Management Practices (BMP's) guidelines will be followed.

d. Wildlife den trees will be retained as well as six standing dead snags per acre when available.

2. HERBICIDES

For the herbicides commonly used by the Forest Service in its management activities, Human Health and Ecological Risk Assessments (RA) are prepared. In these documents, the process of risk analysis is used to quantitatively evaluate the probability that a given pesticide use might impose harm on humans or other species in the environment. The Forest Service then incorporates the relevant information from the RA into the appropriate environmental assessment document prepared for herbicide projects that are used to disclose potential environmental effects to the public.

The following general mitigating measures for herbicide use apply to Alternatives 2 & 3. They are taken from current risk assessments as prepared for the U.S. Forest Service by Syracuse Environmental Research Associates, Inc. (SERA) for all proposed herbicides to be used in implementation of this project (USDA, 1999 and 2003). See section 11 of this EA (Human Health Factors) for more information.

a. Each Contracting Officer's Representative (COR), who must ensure compliance on contracted herbicide projects, is a certified pesticide applicator. Contract inspectors are trained in herbicide use, handling, and application. Herbicides are used in compliance with all Federal, State and local laws and regulations.

b. Notice signs will be clearly posted on herbicide-treated areas.

c. Herbicides will not be applied within 100 feet of private land or a domestic water source, or within 300 feet of a private residence.

d. Herbicides will not be applied within 30 feet of any spring or stream, or within 50 feet of any perennial stream.

e. Herbicides will not be applied within 60 feet of any threatened, endangered, proposed, or sensitive plant. However, after site-specific analysis, the district biologist can prescribe mitigation measures which allow treatment within this zone. Buffers are clearly marked before treatment, so that applicators can easily see and avoid them.

f. Application equipment, empty herbicide containers, clothes worn during treatment, and skin will not be cleaned in open water or wells.

g. Herbicide mixing, loading, or cleaning areas in the field will not be located within 300 feet of a private residence, open water or wells, or other sensitive areas.

h. Accident preplanning will be done, and emergency spill plans (FSM 2109.12, chapter 30) will be prepared.

Additional mitigation measures for Integrated Pest Management adhered to by the U.S. Forest Service are listed in the LRMP pages 3-4, and 3-5.

3. HERITAGE RESOURCES

Heritage resources consideration has been given to all acres where site-disturbing activities are proposed. Findings are discussed in the Heritage Resources Section of this EA. Any other sites found during implementation of this project will be examined and necessary mitigation measures prescribed by the Forest Archaeologist (FLMP, pp. 3-16).

4. PRESCRIBED BURNING

The following is a summary of mitigation measures found in the FEIS, pages 3-397 to 3-408:

a. All prescribed burns require the completion and approval of a prescribed burning plan for each specific project. This plan includes smoke management to comply with air quality regulations and protect visibility in smoke sensitive areas.

b. Water diversions will be installed and firelines revegetated promptly to prevent erosion.

c. Coordination with neighboring Districts and Fire Dispatch regarding planned ignitions, and analysis of transport winds and mixing heights will be utilized to avoid smoke impacts to major metropolitan areas and other "communities at risk" downwind.

5. MONITORING

All activities will be monitored to ensure mitigation measures are applied.

a. Survival checks will be done to determine the effectiveness of reforestation activities and ensure that the stands have been re-established.

b. Herbicide off-site movement will be monitored on the district. Samples on a percentage of the areas will be taken before, during, and after herbicide applications. They will be analyzed by a certified testing laboratory.

Table 3. Comparison of Alternatives' Effects.

	Alternative 1	Alternative 2	Alternative 3
Soil Resources	Natural erosion continues; unmaintained roads continue to erode	Total expected temporary reduction of soil productivity would be 222acres (8% of the harvested area) Fireline construction resulting in temporary loss of soil productivity = 17 acres (0.1% of burned area)	Total expected temporary reduction of soil productivity would be 222 acres (8% of the harvested area) Fireline construction resulting in temporary loss of soil productivity = 17 acres (0.1% of burned area)
Water Resources	Disrepaired roads contribute to stream sediment; currently 173%	198% increase in sediment within the 6th level watershed; concern level = low	198% increase in sediment within the 6th level watershed; concern level = low
Air Resources	No change from current conditions	Short term direct effects include: Daily (~3,500 ac.) emission volumes: 9,814 tons of CO_2; 393 tons of particulate matter	Short term direct effects include: Daily (~1,500 ac.) emission volumes: 4,842 tons of CO_2; 194 tons of particulate matter
Road Access	Roughly 78 miles of roads in and around the analysis area. About 34 miles of open road	22 miles of maintenance, 16.1 miles of reconstruction, 13.3 miles of road decommission.	22 miles of maintenance, 16.1 miles of reconstruction, 13.3 miles of road decommission.
Heritage Resources	16 previously recorded sites will continue to deteriorate; no additional surveys would be conducted; no sites would be addressed for their National Register of Historic Places Eligibility	8 new sites discovered, two of them are recommended eligible for listing in the National Register of Historic Places; more sites may yet be found	8 new sites discovered, two of them are recommended eligible for listing in the National Register of Historic Places; more sites may yet be found
Vegetation Resources	As forest ages, it will become more vulnerable to outside elements; decrease in early-seral veg. = decrease in biodiversity	Even-aged management= 1,122 acres (13% of project area), Thinning= 1,116 acres; indirect/cumulative effects = increase in biodiversity, more benefits to oak regen. from Rx fire	Replacing foliar herbicides with handtools would slow regeneration of desirable species. Undesirable species could out-compete desirable species. Ability to complete planned Rx burns may be limited due to increased burn days
Wildlife Resources	Short term early successional habitat in regenerated stands would not occur. Negative indirect impacts to wildlife species. No benefits from Rx Burning	Thinning and wildlife opening creation would yield positive indirect impacts to wildlife, Increased abundance of soft mast species; increased wildlife benefits from increased Rx fire and regeneration harvests; re-establishment of native grasses using herbicides	Less herbaceous vegetation abundance and diversity for wildlife due to stump sprouts as a result of no foliar herbicide applications. Reduction of oak/pine regeneration with lack of foliar herbicide use. Ability to complete planned Rx burns may be limited due to increase of burn days
PETS	No negative adverse effects would occur to Region 8 sensitive species; however, some benefits to species needing open habitats may be bypassed	Benefit to species which require open and/or fire-dependent habitats; implementation of this proposed project may benefit Ozark big-eared bat, Gray bat and Indiana bat by providing habitat improvement.	TES bat species would not benefit as much due to decreased vegetation effects/responses as well as prey decreases with less herbicide use.
Wetlands & Riparian Areas	No change from current conditions	No change from current conditions; No timber harvests proposed in riparian areas; BMP's will be followed.	No change from current conditions; No timber harvests proposed in riparian areas; BMP's will be followed.

Table 3. Comparison of Alternatives' Effects. (cont'd)

Human Health	Potential effects of injury and damage to personal property in oak decline areas remain; mainly on travelways and camping/hunting sites	Risks of injury/damage to personal property in oak decline areas reduced; risk of worker injury rises due to timber harvest, TSI, WSI, and burning; risks of smoke effects to neighbors increases	Risks of injury/damage to personal property in oak decline areas reduced; risk of worker injury rises due to timber harvest, TSI, WSI, and burning; risks of smoke effects to neighbors increases
Social & Economic Factors	There would be no economic benefits to the local communities resulting from jobs created by timber sales or money to be used for wildlife habitat needs (KV money).	Activities proposed would affect the local economy by supplying timber for local mills, employing loggers to harvest timber, employing people to do site preparation, release, and wildlife habitat improvement work. Revenue generated for roads/schools	Activities proposed would affect the local economy by supplying timber for local mills, employing loggers to harvest timber, employing people to do site preparation, release, and wildlife habitat improvement work. Revenue generated for roads/schools
Recreation	This alternative will not change the recreation use (OHV driving, camping, hiking, mountain bicycling, or fishing) in the project vicinity.	Short-term browning of vegetation from herbicide use and burning could occur. More visually-penetrating views into forest for motorists… more occasions for wildlife viewing, too	Short-term browning of vegetation from herbicide use and burning could occur. More visually-penetrating views into forest for motorists… more occasions for wildlife viewing, too

Part 3 – Environmental Consequences

This section summarizes the physical, biological, social, and economic environments of the affected project area and the potential changes to those environments due to implementation of the alternatives. It also presents the scientific and analytical basis for comparison of alternatives presented in the chart above.

1. Water Resources

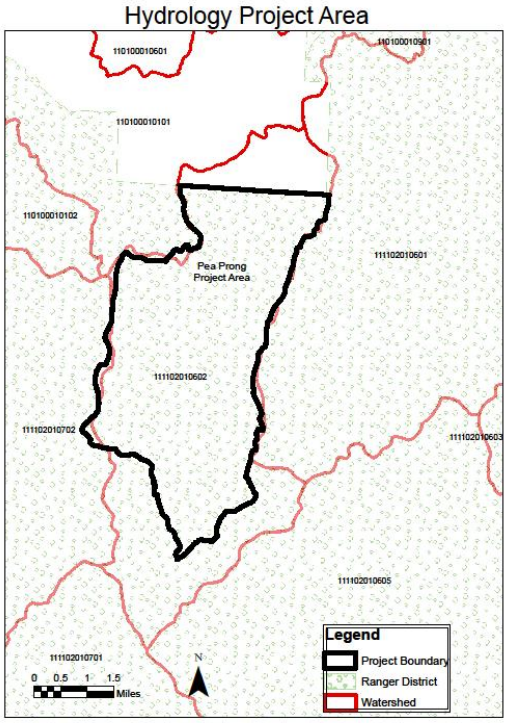
Significant Issues Related to the Resource

Issue #1

The cumulative effects of herbicide use on water quality, especially foliar spraying and its likelihood of entering nearby streams and local water supplies.

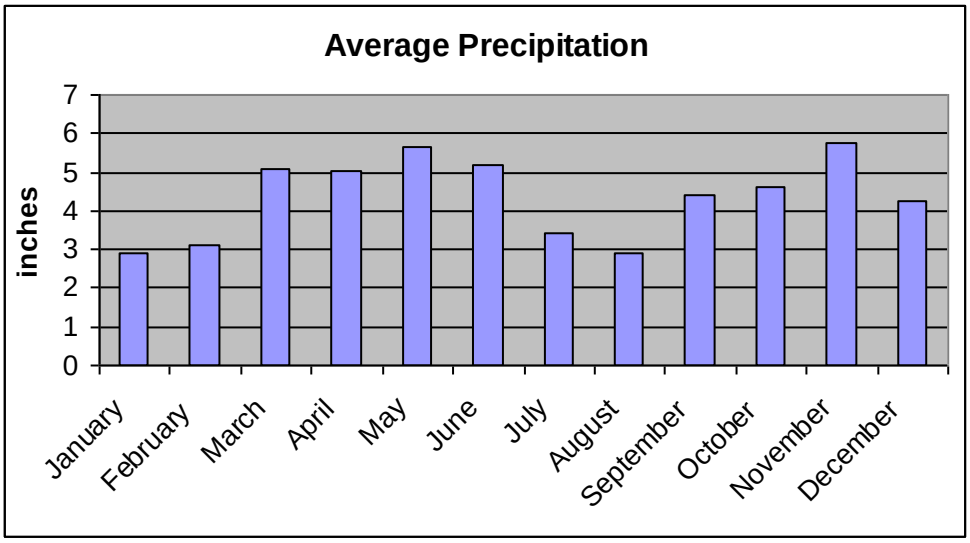
Existing Condition

Watersheds in the United States are divided into progressively smaller units known as hydrologic units, recognized by the United States Geological Survey (USGS) - as regions, sub-regions, basin, and sub-basin units. This hierarchical division of watershed boundaries is useful for assigning address-like codes to drainage basins. This project area falls within the Arkansas-White-Red region (11), the Lower Arkansas sub-region (1111), the Lower Arkansas-Fourche La Fave basin (111102), and the Frog-Mulberry sub-basin unit (11110201) (USGS-NHD and EPA, 2000; FGDC, 2002). The Ozark-St. Francis National Forests further classify land areas into progressively smaller units: watersheds and sub-watersheds. The proposed project falls into the Headwaters Mulberry River (1111020106) watershed. At the smallest scale, the proposed project is located in the Lower Little Mulberry Creek (111102010602) sub-watershed. This sub-watershed, or 6^{th} level Hydrologic Unit Code (referred to as watersheds), will serve as the analysis boundary for the proposed project with respect to water resources. The proposed project area as discussed in this section of the document will consist of the compartment boundaries where activities are proposed.



The project area and the sub-watershed analysis area support streams and rivers that have a dendritic drainage pattern. Dendritic drainage patterns typically have branching tributaries, which can concentrate precipitation across a wide area into one main stream channel. The primary streams that are found in the project area are: Pea Prong Creek, Friley Creek, and Lick Branch and unnamed tributaries to these streams. The creeks and tributaries flow south into the Mulberry River which then flows west and subsequently feeds the Arkansas River. No significant dams or significant-sized bodies of surface water are found within the analysis area watershed (USGS, 1999; NHD, 2000). The Arkansas Department of Environmental Quality (ADEQ) maintains a monitoring station (ARK 0144) on Friley Creek on the eastern side of the project area.

The project area geology consists of Pennsylvanian-age clastic sedimentary rocks of the Atoka formation (McFarland, 2004). This formation is predominantly composed of alternating sandstone and shale layers. Furthermore, the formation's structure and bulk characteristics do not support particularly good aquifers; in fact, the shale layers act as aquicludes preventing deep-seated infiltration. Therefore, the base flow contributions necessary to maintain perennial streams are highly variable and associated with seasonal climatic precipitation variation and shallow soil properties. This is documented by the Arkansas Geological Commission's (1975) low-flow determination of the Mulberry River which indicates base flows (exceeded 90% of time) of 2.7 CFS and 7-day low flows of 1.4 CFS for a 2-year recurrence interval.



Climate information obtained for the project area was derived from information for the town of Ozone, AR (NRCS-Climate Product). The bars on the above graph indicate average precipitation over a thirty year data period or climatic norm. Mid-winter and late summer are found to be the driest portions of the year; this suggests that stream flow will most likely be the lowest during the late summer.

Research conducted by Rogerson and Lawson (1982) on the hydrological characteristics of mixed hardwood watersheds in the Boston Mountains, reveals some important traits for runoff and stream flows within small ephemeral streams of this area. Runoff should be expected to occur every month except for the driest summer months, and the precipitation required to initiate channel flow is between 12-40 mm (.47-1.5 in). Very large discharges, termed by the authors as those above .1m^3/s, occurred 1.25 times per year and were initiated by precipitation in excess of 75 mm (2.9 in.) on very saturated soils. Soil moisture maintained consistent levels during the vegetation dormant season and correlated with the majority of the runoff periods during this study. During the vegetation growing season, soil moisture levels were found to dramatically drop due to evapotranspiration, and large summer storms were required to initiate stream flows as a large capacity of soil moisture storage was available for infiltration. Small stream channels known as ephemeral streams and headwater streams commonly carry storm-flows especially during the spring when there is little evapotranspiration and often drenching precipitation. Additional studies by Lawson, et al. (1985) reported that for storm-flow values, the average turbidity from these ephemeral streams over a five year period averaged from 19 – 40 NTU in the absence of any vegetation treatment. The authors concluded that as a result of their sampling methodology the results were heavily biased by large turbidity values resulting from a few number of storm flow events. These results are interpreted to indicate that storm flows are initiated by above average rainfall events and on occasion significant precipitation events can drive naturally occurring turbidity values in excess of 19 NTU from ephemeral streams in small undisturbed watersheds.

Within the watershed analysis areas approximately 69% (or 11,208 acres) of the analysis area is administered by the Forest Service. This leaves a sizable area of the land within the watershed as privately owned, roughly 31% or 5,062 acres. Land use within the analysis area

is approximately 96% forested. The balance of the watershed land uses are mainly agricultural type land uses.

Forested land uses indicate a stable landscape that results in minimal amounts of natural or background erosion, especially for Arkansas (Miller and Liechty, 2001). For many parts of the Ozark-St. Francis NFs, the prevalent soil cover contains many rocks and rock fragments which ultimately limit the erosive susceptibility of the soils. Measured erosion for minimally-disturbed forest lands rarely exceed 0.25 tons per acre where soil erosion from cropland has been estimated at 3.8 tons per acre (Patric, et al., 1984; USDA SCS, 1989).

Within the watershed analysis area (16,225 ac.), roads are found both within the forest boundaries and outside the forest boundaries. There are approximately 66 miles of roads within this area. This translates into a road density of 2.6 miles per square mile and includes all roads as determined from forest wide information. However, within the project area or compartment boundaries (10,974 ac.), there are approximately 55 miles of roads, which translate to approximately 3.2 miles of road per square mile.

There are approximately 97 acres of floodplain within the project area. These occur in narrow strips along Friley Creek, Little Mulberry Creek, and the lower reaches of Lick Branch and Pea Prong. Much of the project area is included as a water supply intake protection area. There are some small areas of poorly-drained hydric soils in depressions included in the Ceda cobbly fine sandy loam and Spadra fine sandy loam soil map units on the floodplains along these four watercourses. Hydric soils are one of the three components of a wetland. Water and wetland plants are the other components. Wetlands are "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas."

The proposed project is located in the Boston Mountain ecoregion as identified by the EPA (2003) as a revision of work produced by Omernick (1987). These are the same ecoregion divisions recognized by the state for use in defining water quality standards. Thus, water quality standards for the project area, and the sub-watershed analysis area for this project, are determined by the Arkansas Pollution Control and Ecology Commission Regulation 2 – Water Quality Standards for Surface Water (2004). The designated uses assigned to the surface waters in the project area are as follows: for all waters, secondary contact recreation, domestic, industrial and agricultural water supply, seasonal Boston Mountain stream fishery. For surface water where the watershed is greater than 10 mi^2, and all lakes and reservoirs, the designated uses are the same as above but include primary contact recreation and the perennial Boston Mountain fishery. The streams within the project area drain south into the Mulberry River approximately 1.6 miles south of the southern border of the project area. The Mulberry River is listed as an Extraordinary Resource Water.

Existing land uses in the region, and their impacts on water quality have been studied by the US Geological Survey's Ozark Plateaus National Water Quality Assessment Program. Trends that show increased nitrogen, phosphorus and coliform bacteria concentrations occur with increases in agricultural and urban land uses (Davis and Bell, 1998). Forested land uses have a much lower concentration of these constituents. This data does not isolate the direct

or transient effects of timber harvest on nutrients, but it does illustrate the water quality impacts of alternative land uses in the Ozarks and surrounding Arkansas landscapes.

Direct and Indirect Effects

Alternative 1

Selection of the No Action Alternative will result in no direct effects because no activities will be conducted for this project. The current trends and conditions are expected to continue. Indirect effects will continue to result from the existing conditions of the project area. The effects of vegetation on water yield within the watershed will continue through evapotranspiration processes. Roads that do not receive necessary maintenance will continue to pose a chronic threat to water quality as problem erosion areas will continue to exist, or worsen.

Roads are the most common source of accelerated erosion on National Forest lands. Roads generate sediment from the erosion of excavated surfaces, ditches, and road maintenance operations. Raw ditch lines and roadbeds would be a continual source of sediment, usually due to lack of maintenance, inadequate maintenance, excessive ditch line disturbance, or poorly timed maintenance. As a result of this alternative, roads in need of maintenance and reconstruction will not receive the necessary upgrades to minimize resource conditions. Unpaved roads paralleling and crossing streams will continue to pose specific risks to water quality as they often maintain linkages with the stream channel.

Activities associated with any other projects being conducted within the analysis area would affect any cumulative effects. However, no other projects are currently planned within this watershed.

Alternatives 2 & 3

The main issue with respect to forest management activities and water quality is effects to water quality that may result from the proposed project; changes to water quality should not exceed the standards determined for the identified designated uses. The activities which may elicit direct and indirect effects are those of vegetation management, silvicultural site preparation, road construction, reconstruction, and decommissioning, and prescribed burning.

In a summary of silviculture activity effects in the Ozark-Ouachita Highlands, Lawson (1986) documented the amount of sediment produced from small watersheds in the undisturbed state and the amount that is produced as a result of vegetation management practices. The undisturbed sites produced about 13.8 lbs/acre of sediment with 70% of this amount attributed to large precipitation events. A seed-tree harvest produced more than twice as much sediment, 31.3 lbs/acre during the first year after harvest. Three years after the treatment the erosion rates were similar to those of the undisturbed state. Another study by Lawson and Hileman (1982) investigated the effects of the seed-tree removal and site preparation burning. The results indicated that there were no statistically significant differences in stream turbidity between seed-tree removal sites and undisturbed control sites. Thus, seed-tree silvicultural practices in Arkansas will result in the production of sediment, but at levels below those found on typically managed forest lands of the eastern US. The Pea Prong project proposes shelterwood harvests, which are not as intensive as seed-tree harvests.

Therefore, the vegetation management practices proposed for this project will result in temporary increases of sediment but at relatively low levels for a short duration.

Using paired watershed studies for regions of the United States, effects of silviculture practices on annual average stream discharge was depicted by Stednick (1996). In this study, the actions necessary for producing measurable increases in water yield from forests in Arkansas was determined to be a 50% reduction in basal area across an entire watershed. This level of vegetation harvest would result in an increase of roughly 6 inches above normal runoff values for the first year. The recovery period for water yield to return to pretreatment level was found to be a function of vegetation re-growth. For Arkansas, this means that water yields should return to pretreatment level quite rapidly; however, changes to peak flow and storm flow timing may continue if drainage patterns are altered by activities such as road construction. Any changes to runoff timing should not result in impacts to current water uses or quality. Additional studies in the Missouri Ozarks by Stettergren and Krstansky (1987) indicate that for small watersheds where a regeneration treatment has occurred, slightly higher storm flows and peak discharges have been noticed; however, the absolute amounts of increased yield were not of notable quantities. This study also noted that the time to peak and total flow duration was unchanged.

The included watersheds are 96% forested and only 11% of it is proposed for harvest. The proposed action will reduce the basal area by less than 50%, so the proposed harvest is not expected to notably affect water yield.

Long term implications of nutrient loading after timber harvest for streams in the south were described in a study by Lynch and Edwards (1991). In this study, best management practices were used that include 100-foot wide perennial buffers, logging slash removed from streams, sale units monitored by a responsible party, operations ceased during wet weather, roads laid out by a professional, roads did not exceed 10% grade, culverts were used to cross perennial streams and removed when done, water bars utilized, roads gated, and filtration strips maintained. The results indicated that nutrients will not exceed water quality standards and that only during the treatment year would nutrients show a statistically significant increase. An important conclusion was the demonstration of the effectiveness of BMPs for controlling nutrient export.

Forest management options typically include the use of chemical pesticides in the form of herbicides to control unwanted or inappropriate vegetation growth. The use of chemicals may affect stream habitats directly (through acute or chronic toxic effects) or indirectly (as a result of changes to the composition of plant communities). Direct effects depend on two factors, the toxicity of the herbicide and the level of exposure. Toxicity varies among the products used, where common chemicals such as glyphosate are only slightly to non-toxic to aquatic organisms to chemicals such as triclopyr ester which pose a greater risk to fish and invertebrate toxicity.

Exposure is determined by such conditions as application rate, chemical behavior in the environment and biological factors. Herbicides for forestry applications occur annually in amounts roughly equivalent to one tenth of one percent of their use in agriculture settings. Additionally many chemicals used in forestry applications break down fairly rapidly under normal conditions, usually within several weeks. Chemicals can enter streams through a variety of mechanisms, by direct application, drift, mobilization of residues in water,

overland flow and leaching. The most significant transport pathway would be direct application, drift, and mobilization during periods of heavy precipitation and overland flow. The most effective means for reducing this likelihood is to maintain a buffer between the area for use and waterbodies, and to plan appropriately for application time frames.

Herbicide application to control competing vegetation does not disturb the nutrient rich topsoil layer, does not create additional bare soil, and does not adversely affect watershed condition when used responsibly (Neary and Michael, 1996). By utilizing herbicides, the organic matter is left in place and off-site soil movement does not increase the loss of nutrients following harvest activities compared to the other types of management practices. Maxwell and Neary (1991) concluded in a review that the impact of vegetation management techniques on erosion and sedimentation of water resources occurs in this order, herbicides < fire < mechanical. They also concluded that sediment losses during inter-rotation vegetation management could be sharply reduced by using herbicides and moderate burning instead of mechanical methods and heavy burning.

When herbicide fate is measured in runoff water, two common outcomes are apparent. First, measured peak concentrations are of short duration. Second, the highest concentrations occur when buffer strips are not used on streams or where the streams were accidentally over flown during aerial application (Neary and Michael, 1996). Glyphosate has been frequently used in forest ecosystems because of its low mobility. It is readily immobilized by organic matter in the forest floor. Most studies have measured peak glyphosate concentrations in stream flow at or below 10 milligrams per cubic meter (mg/m^3) (an order of magnitude below EPA established Health Advisory Level (HAL)). As seen with other herbicide data, the highest glyphosate peak concentrations occur when buffer strips are not used as a best management practice (Neary and Michael, 1996). Picloram and Triclopyr are also common herbicides used in forestry applications. In a review of studies looking at stream flow fate of these herbicides, a similar pattern is noted as with other herbicides, that the highest peak concentrations are found when buffer strips are not utilized as BMPs. When buffer strips are employed as a mitigation measure, peak concentrations of these chemicals have not been found to exceed 40 mg/m^3, below the Reference Dose (RfD) of both Triclopyr and Picloram. Some agricultural crops can be affected by Picloram levels < 50 mg/m^3 (Neary and Michael, 1996). Where buffer strips are used or other mitigation techniques are employed, forestry herbicides generally do not pose a threat to water quality. Peak concentrations are usually low (< 100 mg/m^3) and do not persist for long periods of time (<6 mos.) (Neary and Michael, 1996).

Forestry use of herbicides poses a low pollution risk to groundwater because of its use pattern. Herbicide use in forestry is likely to occur only once or twice over rotations of 25 and 75 years. The greatest potential hazard to groundwater comes from stored concentrates, not operational application of diluted mixtures (Neary and Michael, 1996). Regional, confined, groundwater aquifers are not likely to be affected by silviculture herbicides (Neary, 1985). Surface unconfined aquifers in the immediate vicinity of herbicide application zones have the most potential for contamination. It is these aquifers which are directly exposed to leaching of residues from the root zone. The only known groundwater contamination incidents of any importance (contamination of bedrock aquifers, persisting > 6 mos., concentrations in excess of the water quality standard, etc.) in the southeastern United States, where higher amounts of forestry herbicides are used, involved extremely high rates of application, or spills of concentrates. In these situations, herbicide residue was detected in

ground water 4 to 5 years after the contamination. These situations are definitely not typical of operational use of forestry herbicides. Proper handling precautions during herbicide transport, storage, mixing-loading, and clean-up are extremely important for preventing groundwater contamination (Neary and Michael, 1996).

Although short term, low-level stream contamination has been observed for ephemeral to first-order streams draining studied sites, levels of herbicides in these streams have been neither of sufficient concentration nor of sufficient residence time to cause observable impacts on aquatic ecosystems (Michael, et al., 2000). These studies have, with a few exceptions, confirmed the absence of high levels of contamination of surface water. Thus, herbicides used properly can help protect water quality in the reduction of sediment in streams while accomplishing forest management goals. It is imperative that pesticides, unless clearly labeled for aquatic uses, must not be applied directly to water, and that pesticides should be used around water resources which are particularly sensitive only after careful considerations of the ramifications (Michael, et al., 2000).

From a review of literature surrounding herbicide application and use on forest lands, and monitoring conducted on the Ozark-St. Francis NF, it has been determined that the selection of this alternative could potentially result in low levels of herbicide residues entering waterbodies within the project area (Supervisor's Office, unpublished reports). However, the levels found in the past and those anticipated for the future, are expected to be very small, and not in excess of the levels of concern established by the EPA. The OSFNF utilizes standards for herbicide application which require buffers between treated vegetation and waterbodies, as well as standards to ensure that drift and direct application to waterbodies do not occur. This alternative includes the use of BMP practices and monitoring to ensure environmental quality is maintained.

When used for site preparation, herbicides are applied by direct injection, or foliar spray (Alt. 2 only). For these purposes, herbicide use is infrequent (1-2 times per 100 yrs.) and direct application methods would minimize off-site movement. Forest wide standards for herbicide application will be followed as well as appropriate BMPs designed to limit risk to water quality. Monitoring for herbicides used on the forest has been a continuous policy on OSFNF for over 10 years. Results from this monitoring have not documented any significant concentrations of herbicides off-site from their application (unpublished reports). Other monitoring suggests that subsequent to runoff producing precipitation events, concentrations of herbicide (triclopyr) in ephemeral streams with BMP protections were very small and well below any significant risk concentration (unpublished report). The third alternative includes elimination of foliar spray. Although this alternative could further reduce the already low risk of contamination, it does not affect the potential for sediment delivery to streams.

Roads are the most common source of accelerated erosion on National Forest lands. Road-generated sediment may result from the erosion of cut and fill slopes, ditches, road surfaces, and road maintenance operations. Unpaved roads paralleling and crossing streams pose specific risks to water quality as they often maintain direct linkages with the stream channel. Roads result in three primary effects on forested lands. They can intercept rainfall directly, concentrate flow, and divert or reroute water from traditional hydrologic pathways. Through these actions, road systems mimic the stream channel network, effectively increasing the drainage density of streams in the landscape. This may result in modifications to the timing of water delivery to stream systems; however, this is not expected to be a measurable

difference from current conditions. The activities of the proposed action will work toward 'disconnecting' the road system from the stream network.

Reconstruction of 16.1 miles of road and construction of 7 miles of temporary road are proposed for this project. Road construction in areas near streams could be responsible for large sediment delivery rates to the streams if proper BMPs are not followed and heavy rainfall events occur during construction. Guidance provided in the Forest Land and Resource Management Plan and the Arkansas Forestry Silviculture BMP manual outline the mitigation measures necessary to conduct these activities while controlling contributions to non-point source pollution. The remainder of the road work is maintenance, which when properly conducted, should result in a net decrease in sediment production, thus a benefit. Also approximately 13 miles of road are proposed for decommissioning as part of this project, resulting in a decrease of potential sediment due to an overall decrease in road density for the watershed.

The main effect of burning on water quality is the potential for increased runoff of rainfall. Runoff may carry suspended soil particles, dissolved inorganic nutrients, and other materials into adjacent streams and lakes, reducing water quality and degrading fish habitat (Wade and Lundsford, 1988). However, most studies in the south indicate that effects of prescribed fire on water quality are minor and of short duration when compared with effects of other forest management practices. For example, Neary and Currier (1982) reported no adverse effects to water quality after a severe wildfire in heavy fuels in the Blue Ridge Mountains of South Carolina. In the Georgia Piedmont, low-intensity fires have had little effect on hydrologic properties of soils (Brender and Cooper 1968) and streamwater quality (Douglass and Van Lear 1983, Van Lear and Waldrop 1988). Even where sedimentation and dissolved nutrients increase in stream water in response to burns, the amounts are often negligible. For example, Neary and Currier (1982) reported that wildfires in the Blue Ridge Mountains resulted in a threefold increase in NO_3, but resulting concentrations were still low (0.012 mg N per liter). After a site-preparation burn in north Mississippi, Ursic (1970) reported that although sediment levels on burned watersheds were several-fold greater than those of control plots, sediment output was only about 0.5 ton per acre per year. Phosphorus and major cations often increase in stream flow and the soil solution after intense slash fires, but the effects are of short duration and of a magnitude not considered damaging to surface water or site productivity (Tiedemann, et.al., 1979). Van Lear and Waldrop (1988) concluded that properly conducted site-preparation burns cause minor nutrient loss and stream sedimentation compared with those resulting from mechanical methods of site preparation. Rapid vegetation regrowth in this part of the country quickly protects any disturbances to the landscape.

Prescribed burning is included in the sediment model for both alternatives 2 and 3. However, because the model assumes that all project activities are conducted simultaneously, it indicates no difference between burning up to 4,000 acres per day in alternative 2 and burning up to 1,500 acres per day in alternative 3.

The direct and indirect impacts from this project are not expected to contribute to degradation of the current water quality. Implementation of the activities associated with these alternatives will result in some of the above-mentioned effects to water quantity and quality; these effects have been shown from past research to be minimal and short-lived in this part of Arkansas. The stands along Friley Creek that fall within the Riparian Management Area or

Streamside Management Zones would be treated with RSI if they are not deemed to be operable for timber harvest. If trees were cut down and left and not harvested it would increase the roughness coefficient of the floodplain which would decrease flow velocities during flooding which would decrease flood potential downstream. Slowing velocities would also allow fine materials to drop out during floods which would increase soil productivity within the flood plain. Stumps and roots would remain to protect the soil from erosion until understory and midstory species developed in the openings created by felling the trees. It would increase the potential for this wood lying on the floodplain to be imported into the channel increasing the large wood in the actual channel. It would decrease the competition for resources due to fewer stems per acre which would increase growth rates of the remaining trees. Lastly by thinning the overstory it would allow midstory species like native cane to potentially reestablish within the project area bringing back this rare community and associated wildlife. This rare community was historically very dominant within riparian areas within the Forest. The most likely effects from these alternatives, beyond current conditions, are a short-term increase in sediment resulting mainly from road activities and minimal increases in water production. With the application of the Arkansas Forestry Commission's Best Management Practices for Silviculture, current Forest Plan standards, and any other mitigation measures noted in this EA, the activities of this alternative should not result in detrimental effects to the water resources. Road stabilization through maintenance and construction, erosion control through revegetation of disturbed ground, and streamside management zones around surface water features are typical measures used to ensure the mitigation of adverse effects which may occur. The proposed activities are not expected to negatively affect the functions and values of the floodplains and small inclusions of wetlands.

Cumulative Effects

For this analysis, the cumulative effects to water resources will be bound by the 6th level watershed in which the project is located (see current conditions). Cumulative effects result from practices which occur throughout the watershed, on both private and public lands. Activities and land uses identified for areas not administered by the Forest Service were determined from publicly available data. The major non-point source pollution concern that arises from Forest Service activities is that of soil erosion which can potentially result in increased sedimentation of aquatic habitats or threaten water quality as turbidity.

The cumulative effects analysis estimates sediment yield from both public and private lands, the existing road network, and from expected current and future activities. Current and future sediment yield is compared to estimates of an undisturbed landscape (or past condition). An undisturbed landscape is described as an entirely forested watershed without roads. Sediment increases are then calculated as a percent above the undisturbed amount. This value is compared to potential risk values for identifying levels of concern for watershed conditions. These risk indicator values were empirically determined using a relationship between sediment values and the condition of the fisheries from select locations across the area.

The cumulative effects analysis assumes that particular activities occur on public and private lands. The assumption is made that all the activities on public lands as described under each alternative, will occur during a one year time frame, or as an instantaneous event. In practice these activities are usually spread over a number of years, thus amortizing the potential

effects over the life of any resulting projects. Assumptions are included in the determination of the potential risk indicator values; these values were determined on a smaller-scale, ecoregion basis, using community-based fish information. Different guilds within the fish communities were analyzed for predictive patterns of response to sediment loading. The most responsive patterns were used to set the risk level values. This allows for a determination of the 'worst case' scenario, providing a conservative understanding of effects to the water resources and designated use fisheries.

There are two risk values for every sixth-level watershed; the first separates the low and moderate concern level and the second separates the moderate and high concern level. A low concern indicates a minimal risk to water quality, or no expected adverse effects to water resources or the designated uses. A moderate concern indicates that care should be taken designing and implementing the project to avoid adverse effects and that additional aquatic monitoring should occur prior to project implementation. Proper application of all forest plan standards and Arkansas BMPs should be verified for implementation. Assuming these guidelines are correctly applied, this project would result in minimal risks to water quality; if these standards are not applied then a greater risk to water quality results. A high concern signals that the water resources may be threatened by the current or future state of the watershed. Proposed activities should only be conducted with the application of appropriate forest plan standards and BMPs. Short-term adverse effects to water resources may result from activities captured in the effects analysis, both on public as well as private lands. Additional monitoring is necessary to determine that no adverse effects to the water resources are the result of Forest Service activities; this includes monitoring for adequate BMP compliance.

The water resource cumulative effects analysis was completed based on the activities described in this document. All supporting material for this model has been included in the project planning files. The results of this analysis are displayed in the following table. This analysis indicates that all watershed analysis areas are currently found to have a low concern level. As a result of the No Action alternative the concern level will remain Low, and under any of the Proposed Alternatives the concern level remains Low. The cumulative effects analysis was done for the activities proposed in the Lower Little Mulberry Creek Watershed (111102010602) (16,267 acres) which is located within the larger Headwaters of the Mulberry River Watershed (1111020106) (104,956 acres). The analysis indicates that the concern level will remain low for the Lower Little Mulberry Creek Watershed after the proposed activities have been implemented, therefore the concern level for the Headwaters of the Mulberry River Watershed would be low to very low.

Results of the Water Resources Cumulative Effects Analysis

Percent increase of sediment above undisturbed conditions								
	Current		Future					
			No Action		Proposed		Reduced Herbicide and Burn	
6th level Watershed Analysis Area	% increase	Concern Level	% increase	Concern Level	% increase	Concern Level	% increase	Concern Level
111102010602	171	Low	173	Low	198	Low	198	Low

The cumulative effects analysis indicates minimal risks to the water resource's current condition. The activities proposed by the Forest Service for the proposed action will result in additional sediment production from the landscape, but from a watershed perspective, contribute only a small (if any) increase to the overall estimated sediment yield. The Proposed Alternative results in a slight increase in the percentage of possible sediment contributions but results in no change in the concern level. Additionally, it should be possible to schedule these activities over time instead of instantaneously as predicted by the analysis, thus reducing the possibility of acute effects. Through the use of forest plan standards and the use of Arkansas Silviculture BMPs, the activities scheduled for implementation should not pose additional risks to water quality or designated uses. Monitoring in the form of subsequent fisheries evaluation and BMP compliance checks should be adequate to discern any adverse effects which may result from the implementation of the proposed action.

2. Soil Resources

Much of the information in this section relies on the soil surveys of Johnson and Madison County (Soil Conservation Service-NRCS), and an article entitled, "The Effects of Forest Management Practices on Soil Nutrient Status," by Drs. Wheeler and Eichmann, University of Arkansas, Fayetteville.

Existing Condition

The analysis area for soils will be Compartments 460, 461, 462, 487, 488, 494, 495, and 667. The Project Area is located on the southern side of the Ozark Plateau in a heavily dissected section called the Boston Mountains. Project Area elevation varies from about 935 feet on the Little Mulberry Creek floodplain in the southern part of the project area to 2360 feet in the northwestern corner of the project area. Several types of topography exist in this Boston Mountain section. Most of the timber harvest will occur on a common Stair-Stepped landform, called "Bluff-Bench" topography, that developed from the long-term weathering/erosion of sedimentary layers of different hardness, mainly shales and sandstones. The remainder of the topography varies from nearly level to steep-to-rolling mountain tops that developed from weathering of level-bedded sandstones to alluvial areas along Lick Branch, Pea Prong, Friley Creek, and Little Mulberry Creek. Most of the

mountain tops and creek bottoms and some wider benches now or have been under cultivation or in pastures. The federal lands that were under cultivation or in pastures are forested. Project area topography varies from 0-3% slope on mountain tops, benches, and creek bottoms, to fairly steep 40-60% on the 200 to 300 foot long slopes between the benches and just above the stream bottoms in Lick Branch, Pea Prong, Friley Creek and Little Mulberry Creek.

The soils in the project area are mostly stable except for an area above and below Johnson County Road 5051 in Section 31 T13N R25W and those in and adjacent to some of the roads. Forest Development Road (FDR) 1540 crosses Lick Branch in several places and each of these crossings is a source of sediment. FDR 1526 is located along Friley Creek and crosses the creek in several places. Sections of the stream bank along Friley Creek are eroding and unstable and the stream channel appears to be wider than it should be for a stream of this size. The road is incised from 18 to 24 inches below the adjacent soil surface and there is evidence that fine sand is being eroded from the road bed and is being deposited in the creek. FDR 1526A is located along Pea Prong and it crosses the stream in a few places. This road also shows signs of erosion. Soils are mostly well-drained and range from shallow to deep. There are some small areas of poorly-drained hydric soils in depressions included in the Ceda cobbly fine sandy loam and Spadra fine sandy loam soil map units on the floodplains along Lick Branch, Pea Prong, Friley Creek, and Little Mulberry Creek. Hydric soils are one of the three components of a wetland. Water and wetland plants are the other components. Wetlands are "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas."

There are some stumps in previously harvested stands, but there is no evidence of detrimental soil disturbance. Stands are well-stocked and are productive. Most of the soils have 100% cover consisting of leaf litter, twigs, limbs, logs, gravel, stones, and have an intact root mat.

Direct and Indirect Effects

Alternative 1

The roads proposed for reconstruction, maintenance, and decommissioning will continue to erode.

Alternative 2

Approximately eight percent (222 acres) of the harvested area would sustain a temporary reduction in soil productivity due to harvesting operations. An additional 12 acres (<1% of the harvest area) would sustain a temporary reduction in soil productivity due to temporary road construction. Soil productivity would be lost on up to 7.8 acres due to road reconstruction. Approximately 17 acres of the burned area would sustain a temporary reduction in soil productivity due to fireline construction. Thirteen miles of road are proposed for decommissioning which will return approximately twenty-two acres of soil to a productive state. The proposed activities are not expected to negatively affect the functions and values of the floodplains and small inclusions of wetlands.

Total expected temporary reduction of soil productivity would be 242 acres (8% of the

harvested area), including skidding, temporary road construction, and road reconstruction. Fireline construction would result in a temporary loss of soil productivity to 17 acres which is 0.2% of the burned area. Road decommissioning would reduce the net acreage of soil disturbance to 240 acres (8% of the harvested area and 0.2% of the burned area). Temporary roads, primary skid trails, and landings would be disked, seeded and closed following harvesting to speed the recovery of the soil productivity. Firelines would be bladed and seeded when prescribed burning is completed to speed recovery of soil productivity and to prevent erosion. Road reconstruction will stabilize roads and prevent loss of productivity on soils adjacent to these roads and will reduce erosion and sedimentation. Road maintenance will also prevent the loss of productivity on soils adjacent to the roads by helping to control runoff. Less than 15% of an activity area can sustain a reduction in soil productivity, according to the LRMP standard. If more than 15% of the activity area sustains a reduction in soil productivity, mitigation measures must be installed. The documentation for temporary reduction in soil productivity can be found in the analysis file.

The use of herbicides would not cause soil disturbance because stems and roots of treated plants would remain in place until they decay. Soil microbes will break down any herbicide residue that reaches the soil.

Cumulative Effects

There is a potential for additional temporary loss in soil productivity in the stands that are proposed for shelterwood harvest and follow-up shelterwood removal harvests that are planned approximately 20 years in the future when the stands receive their first thinning harvest.

Approximately 101 acres of the 1,122 acres proposed for shelterwood harvest may sustain a temporary loss in soil productivity due to detrimental soil disturbance during the initial harvest. An additional 45 acres may sustain a temporary loss in soil productivity due to detrimental soil disturbance during the shelterwood removal harvest. The estimated initial and additional temporary loss in soil productivity equals 146 acres which is 13% of the shelterwood harvest area. The cumulative soil disturbance is expected to be much less because the removal harvest will take place approximately 20 years in the future. During the time between the initial harvest and the removal harvest, the addition of organic matter, cycles of wetting, drying, freezing and thawing, and vegetation growth will reduce the soil impacts of the initial harvest. The cumulative effects are not significant because the existing and estimated temporary loss in soil productivity is expected to be within the LRMP standard. Erosion control will be done on skid trails in the harvested areas to speed the recovery of soil productivity.

There was no evidence of detrimental soil disturbance in the previously harvested units that are proposed for treatment in the project area, so no cumulative effects are expected to result from the proposed treatments.

Soil disturbance is calculated as a percentage of the activity area. The activity area for harvest operations and road work would be the harvested area. The activity area for the soil disturbance associated with fireline construction is the burned area. Soil disturbance for the harvest operations, road work, and fireline construction is expected to be the same for alternatives 2 and 3.

Alternative 3

The soils effects will be the same as those for alternative 2.

Cumulative Effects

The cumulative soils effects due to the activities proposed in alternative 3 are expected to be the same as those in alternative 2.

3. Climate Change

Existing Condition

Research and analysis of evidence dating many years ago show intervals of warming and cooling on earth. The current warming trend is particularly important because it is proceeding at an unusual rate. Assessments by the Intergovernmental Panel on Climate Change (IPCC) suggest that the Earth's climate has warmed between 0.6 and 0.9 degree Celsius over the past century and that human activity affecting the atmosphere is "very likely" an important driving factor. (USDOE, Energy Information Administration, 2008)

The following information is from the National Climatic Data Center website (http://lwf.ncdc.noaa.gov/oa/climate/gases.html): Many chemical compounds present in Earth's atmosphere behave as greenhouse gases. These are gases which allow direct sunlight (relative shortwave energy) to reach the Earth's surface unimpeded. As the shortwave energy (that in the visible and ultraviolet portion of the spectra) heats the surface, longer-wave energy (heat) is reflected to the atmosphere. Greenhouse gases absorb this energy, thereby allowing less heat to escape back to space, and 'trapping' it in the lower atmosphere. Many greenhouse gases occur naturally in the atmosphere, such as carbon dioxide, methane, water vapor, and, nitrous oxide, while others are synthetic. Those that are man-made include the chlorofluorocarbons, hydrofluorocarbons and perfluorocarbons, as well as sulfur hexafluoride. Atmospheric concentrations of both the natural and man-made gases have been rising over the last few centuries. As global population increases and reliance on fossil fuels (such as coal, oil and natural gas) is firmly solidified, emissions of these gases continue to rise. While gases such as carbon dioxide occur naturally in the atmosphere, through our interference with the carbon cycle, we artificially move carbon from solid storage to its gaseous state, thereby increasing atmospheric concentrations (NCDC, 2009).

The principal greenhouse gases that enter the atmosphere because of human activities are carbon dioxide, methane, nitrous oxide, and fluorinated gases (USEPA, 2009). Atmospheric carbon dioxide concentration is now higher than at any time in the past 10 million years (Kennedy and Hanson, 2006). Humankind has altered the natural carbon cycle by burning coal, oil, natural gas and wood and since the industrial revolution began in the mid-1700s, each of these activities has increased in scale and distribution. Prior to the industrial revolution, concentrations were fairly stable at 280 ppm. Today, they are around 370 ppm, an increase of well over 30 percent (NCDC, 2009). In 2006, carbon dioxide emissions from the United States accounted for about 20 percent of the amount added to the atmosphere globally. Fuel combustion accounted for 94.0 percent of U.S. carbon dioxide emissions in 2007; this figure represents approximately 85.4 percent of the nation's total greenhouse gas emissions that year. Changes in land use and forestry practices can also emit carbon dioxide

through conversion of forest land to agricultural or urban use or can act as a sink for carbon dioxide (USEPA, 2009).

Numerous processes collectively known as the "carbon cycle" naturally regulate concentrations of carbon dioxide in the atmosphere. Natural processes, such as plant photosynthesis, dominate the movement ("flux") of carbon between the atmosphere and the land and oceans. Carbon sequestration is the process by which atmospheric carbon dioxide is taken up by trees, grasses, and other plants through photosynthesis and stored as carbon in biomass (trunks, branches, foliage and roots) and soils. The sink of carbon sequestration in forests and wood products helps to offset sources of carbon dioxide to the atmosphere, such as deforestation, forest fires and fossil fuel emissions. Carbon accumulation in forests and soils, however, eventually reaches a saturation point, beyond which additional sequestration is no longer possible. This happens, for example, when trees reach maturity, or when the organic matter in soils builds back up to original levels before losses occurred (USEPA, 2009). While natural processes can absorb some of the net 6.2 billion metric tons (7.2 billion metric tons less 1 billion metric tons of sinks) of anthropogenic (human-caused) carbon dioxide emissions produced each year (measured in carbon equivalent terms), an estimated 4.1 billion metric tons are added to the atmosphere annually. This positive imbalance between greenhouse gas emissions and absorption results in the continuing increase in atmospheric concentrations of greenhouse gases. (USDOE, Energy Information Administration, 2008)

In computer-based models, rising concentrations of greenhouse gases produce an increase in the average surface temperature of the Earth over time. Rising temperatures may, in turn, produce changes in precipitation patterns, storm severity, and sea level commonly referred to as "climate change" (USDOE, Energy Information Administration, 2008). Projected climate change impacts include air temperature increases, sea level rise, changes in timing, location and quantity of precipitation and increased frequency of extreme weather events such as heat waves, droughts, and floods. These changes will vary regionally and affect renewable resources, aquatic and terrestrial ecosystems, and agriculture. Changes in temperature and precipitation will alter the growth patterns and distribution of plant and animal species. There are uncertainties regarding the timing and extent magnitude of climate change impacts, but continued increases in human greenhouse gas emissions will likely lead to increased climate change.

Direct, Indirect, and Cumulative Effects

Alternative 1

It is currently not possible to predict the actual effects of a project on global climate change, so a baseline comparison cannot be made using the no action alternative relative to climate change.

Much of the project area is currently susceptible to climate change events such as prolonged drought due to the stressed conditions of individual trees. Tree crowns and roots have little or no room to expand and stems in crowded stands compete for water and nutrients. Under these conditions, trees are much more likely to die due to added stress from climate change events. If overstory trees die, sustainability of overstory tree species would be in question due to the lack of advanced oak and pine regeneration in the understory.

Because fuel loads within the proposed project area will not be reduced, the potential for an uncharacteristically severe wildfire will persist and increase as fuels are added to the forest floor through natural processes. In such an event, the quantities of carbon dioxide and other greenhouse gas emissions released into the atmosphere would be expected to be greater than those that would have been released under the controlled conditions of a prescribed burn or in an area where fuel reduction treatments had been conducted. The actual quantity of emissions released would depend on the acreage burned, tons of fuel consumed and the amount of time required to suppress the wildfire.

Harvest of trees that have reached or passed maturity will not occur. The ability of those trees to sequester additional carbon from the atmosphere will continue to be less than that of younger stands of trees. No wood products such as wood flooring, furniture and lumber that would store carbon will be obtained from the proposed project area.

Alternatives 2 & 3

Forests and soils have a large influence on atmospheric levels of carbon dioxide. The carbon stored in live biomass, dead plant material and soil represents the balance between carbon dioxide absorbed from the atmosphere and its release through plant respiration as well as decomposition and burning.

With these alternatives, some of the carbon currently sequestered in vegetation and soils will be released back to the atmosphere. In the short-term, greenhouse gas emissions and alteration to the carbon cycle will be caused by hazardous fuel reduction activities, harvests and thinning overstocked stands. In the long term, however, these actions will also increase the forest's ability to sequester additional carbon, improve the forest's resilience to the potential impacts of climate change and decrease the potential for uncharacteristically severe wildfires. Harvest will remove some of the mature stems with diminished ability to sequester additional carbon; some of the carbon sequestered in harvested stems will continue to be stored in manufactured wood products. Residual stems and regeneration in the proposed project area will continue to sequester and store carbon.

Wildfires may still occur in the proposed project area; however, because fuel loads will have been reduced with these alternatives, there will be a lower risk of uncharacteristically severe wildfire for the treated acres than the current condition poses. The reduced risk has a two-fold effect on greenhouse gas emissions or the carbon cycle:

- There is a direct beneficial effect on climate change of decreased greenhouse gas emissions from the treated acres, because the risk of acres being burned by uncharacteristically severe wildfires will be reduced.
- There is an indirect beneficial effect because live stands of trees will retain higher capacity to sequester carbon dioxide compared to stands killed by uncharacteristically severe wildfires, especially if not immediately reforested.

Although it is possible to estimate the quantity of greenhouse gas emissions prescribed burns associated with this project may release, there is no certainty about the actual intensity of the project's individual effects on global climate change. As greenhouse gas emissions are

integrated across the global atmosphere, it is not currently possible to ascertain the degree of indirect effects or cumulative impacts this project will have on global climate.

4. Air Resources

Significant Issues Related to the Resource

Issue #2

The effects of prescribed burning on air quality.

Existing Condition

The entire project area lies within lands designated as a Class II area with respect to the air resource. The Clean Air Act (CAA) defines a Class II area as "a geographic area designated for a moderate degree of protection from future degradation of the air quality."

Existing emission sources occurring within the project area consist mainly of mobile sources. These include, but are not limited to, combustion engines, dust from unpaved surfaces, and smoke from prescribed (federal, local, county) burning.

The primary means of ascertaining dispersion direction and projected PM 2.5 (Particulate Matter in the air 2.5 micrometers or less in size) concentration levels on the Ozark National Forest today is known as HYSPLIT (Hybrid Single-Particle Lagrangian Trajectory). HYSPLIT is a web-based model that combines forecast data, emissions, and heat release rates to estimate downwind pollutant concentration levels. The level of concentration of PM 2.5 becomes increasingly relevant in relation to the pollutant's proximity to population centers, Class I areas, or non-attainment areas.

The purpose of utilizing a program of this nature is to assure adherence to air quality standards and to manage smoke from prescribed fire to keep the smoke's impact on people and the environment within acceptable limits. The Environmental Protection Agency (EPA) has reported that fine particles (2.5 micrometers or smaller) have the potential to impair human health when people are exposed to high levels. The fine particles that can impair human health can also reduce visibility in federally-mandated Class I areas such as Caney Creek Wilderness Area and Upper Buffalo Wilderness Area where regulations have been implemented to make reasonable progress at removing any human impairment of visibility. Prescribed fire managers are using HYSPLIT to predict and subsequently limit public safety hazards posed by smoke intrusion into populated areas, prevent deterioration of air quality, prevent National Ambient Air Quality Standards (NAAQS) violations, and prevent visibility impairment at Class I areas and other smoke-sensitive areas.

The Clean Air Act requires the EPA to establish National Ambient Air Quality Standards (NAAQS) for six pollutants considered harmful to public health and the environment: carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter, and sulfur dioxide. The standards were set at the level required to provide an ample margin of safety to protect the public health. An attainment area is a geographic area in which levels of a criteria air pollutant meet NAAQS for the pollutant. Under the CAA, any area that violates national ambient air quality standards for any of the six criteria pollutants as few times as once per year and as often as four times over a three year period is classified as a "nonattainment"

area. The proposed project area lies within Johnson and Madison Counties in Arkansas. Currently, the levels of all six criteria pollutants are at or below the NAAQS (attainment) in these counties.

Direct and Indirect Effects

Alternative 1

There would be no substantial changes to present air quality. Exhaust emissions and dust from vehicles passing through the project area would continue. Occasionally, local residents will burn trash and small brush piles which will generate smoke.

Alternatives 2 & 3

Prescribed burning proposed in this Alternative will have the potential to impact local and regional air quality. The area immediately downwind will have the greatest chances for impacts. Risks include respiratory damage and temporary impairment of visibility. The (FEISp. 3-62) indicates particulate matter may exceed the EPA 24-hour standard for short periods of time. The management guidelines within the site-specific burning plan will mitigate this effect in the immediate vicinity and downwind from it.

With respect to air quality in the proposed project area, the greatest potential for effect will be caused by prescribed burning. Short-term changes to the current air quality condition, including contributions to the greenhouse concentration of gases in the atmosphere, will result from the prescribed burning in the project. The burning will be conducted in accordance with a prescribed burn plan when conditions are favorable for rapid smoke dispersal. Arkansas Smoke Management Guidelines will be observed. Because residual smoke flows and settles in low areas during the night and early morning and may contribute to heavy fog formation which creates hazardous road conditions, the proposed burn activities will generally be completed by mid-afternoon so that most smoke is dispersed by nightfall. Individual ignitions would typically not exceed 3,000-3,500 acres daily under Alternative 2 and 1,500 acres daily under Alternative 3 with an additional 5 miles of dozer line. However, burning fewer acres per day may result in the District having to burn more days. Ignition of the project area may be spread over multiple years – therefore, reducing potential for smoke impacts. Use of aerial ignition would serve to reduce burn-out time and associated duration of smoke impacts. Aerial ignition would also help develop smoke column lifting and reduction of smoke impacts.

The direct effects of prescribed burning on air quality will include temporary increases in particulate matter and carbon monoxide concentrations, eye, nose and throat irritations, decreased visibility along travel ways, and odor/nuisance of smoke. Smoke consists of small particles (particulate) of ash, partly consumed fuel, and liquid droplets. Other combustion products include invisible gases such as small quantities of nitrogen oxides. Oxides of nitrogen are usually produced at temperatures only reached in piled or windrowed slash or in very intense wildfires. In general, prescribed fires produce inconsequential amounts of these gases. Except for organic soils (which are not typically consumed in prescribed burns), forest fuels contain very little sulfur, so oxides of sulfur are not a problem (USDA Technical Publication R8-TP11). Persons near the actual burn area might receive some respiratory discomfort; however, it is expected that most impacts will be in the form of nuisance smoke

and/or smell. Smoke from the proposed burning and the associated emissions would reside in the local area a relatively short time depending on the weather. Signs will be needed along public roads to warn the public of smoky conditions. Smoke trapped in low-lying areas would be expected to dissipate once morning temperatures rise and the nighttime inversion lifts.

Other primary products of combustion are water vapor, particulate matter, hydrocarbons, carbon monoxide, polyaromatic hydrocarbons, and trace minerals. Carbon monoxide and particulate matter are EPA criteria pollutants. Polyaromatic hydrocarbons are listed as toxic substances. Strict adherence to LMRP guidelines and a site-specific burning plan will limit the area where EPA standards are exceeded to a location very close in proximity to the flaming front. The burning plan will ensure that smoke or other combustion products do not reach smoke sensitive areas. Monitoring during and after the burns for adherence to guidelines and/or any potential problem areas will be conducted. These actions will ensure that the requirements of the Clean Air Act, EPA air standards, and state requirements will be met and there should be no long-term cumulative effects from these burns.

Table 4 lists the estimated amounts of CO_2 resulting from the prescribed burning proposed by Alternatives 2 and 3. The organic matter consumed will be replaced by new vegetation so that there should be little net increase in the carbon dioxide in the atmosphere (Dipert 1992:2 draft/unpublished). Alternative 2 is based on an estimate of 3,500 acres burned daily for a total of ~2 days of burning. Alternative 3 is based on an estimate of a 1,500-acre daily output for a total of ~4 days of burning.

Table 4. Daily total emissions released during Alt. 2 & 3 site prep, thinning, WL, TSI, PCT, and hazardous fuel reduction prescribed burning.

Compound Emitted	Estimated Release (U.S. Tons)*	Estimated Release (U.S. Tons)*
	Alternative 2	Alternative 3
Carbon Dioxide (CO_2)	9,814	4,842
Carbon Monoxide (CO)	1,021	504
Water Vapor	3,926	1,937
Particulate Matter	393	194
Hydrocarbons	98	48
Nitrogen Oxides	18	9
TOTAL	**15,270**	**7,534**

*Estimates of coefficients used for calculations: a) 2.25 tons/ac actually consumed in hazardous fuel reduction burns; 4.5t/ac burned in thinning areas; 5.0t/ac burned in shelterwood areas; (Representative of fuel models in the Prescribed Fire Guide for the Southern Region). b) 2,000-3,000 lbs of CO_2 emitted/ton of fuel burned (Dipert, 1992).

Alternative 2 has more total emissions/day but lasts for only 2 days; Alternative 3 has less volume of emissions/day but lasts for 4 days. This does not take into account the private land acreage that is within the project boundary. Some or a large majority of these lands may be burned, depending on private landowner cooperation with NF prescribed burning agreements.

Cumulative Effects

For air quality, cumulative effects include all reasonable and foreseeable activities that produce pollutants. Emissions from prescribed burning and from vehicles and machinery during management activities will contribute greenhouse gases and pollutants to the atmosphere, but the volume of these emissions will be inconsequential and are not expected to have a cumulative impact on current air quality.

The global effects of prescribed burning are discussed in the VMEIS. The effect of prescribed burning on climate change is dependent on a pool of knowledge yet to be formulated.

Air quality from implementation of the prescribed burning will not be affected by any past burns in the area or by any proposed future burns on the District because once the smoke has dispersed, the emissions are diluted and removed from local airsheds.

An indirect effect of implementing the burning is a reduction in the emissions that would be released from potential wildfires in the area. By removing the small diameter surface fuels with controlled low intensity prescribed fire, the potential of a high intensity catastrophic fire developing within the stands would be reduced substantially. If a crown fire were to occur, the amount of live fuel that could burn would tend to release high amounts of particulate matter.

5. Herbicides

Significant Issues Related to the Resource
Issue #1

The cumulative effects of herbicide use on water quality, especially foliar spraying and its likelihood of entering nearby streams and local water supplies.

Existing Condition

Herbicide use is an important tool for benefiting oak/pine regeneration by providing for these species presence in the ecosystem in the long term. Effects of herbicide toxicity data and dosage estimates for triclopyr, imazapic, imazapyr, glyphosate and hexazinone proposed for use in the action alternatives indicate that there is only a very low risk to wildlife, both from realistic and extreme exposures. Monitoring for herbicide concentrations following use has been a continuous policy of the Ozark-St. Francis National Forests. Monitoring results have not documented any significant on-site concentrations of herbicides or off-site movement. In a study regarding the use of herbicides in forestry applications (Michael, 2001), the author found that maximum pesticide concentrations observed in water have been much lower than the maximum levels which the Environmental Protection Agency (EPA) considers safe for consumption on a daily basis over a lifetime (Health Advisory Level-HAL). In some studies the author reviewed maximum herbicide concentrations observed in ephemeral to first-order streams exceeded the lifetime HAL, but found that they last only a few hours and the highest concentrations did not exceed EPA's 1-day HAL. Even with the widespread use of pesticides in North America, those typically used in forestry vegetation management

programs have not been identified in surface or ground water at sufficiently high concentrations to impair drinking water quality. Their rapid break-down by physical, chemical, and biological routes coupled with current use patterns precludes the development of significant water contamination problems unless they are applied directly to water. Additionally, mitigation measures normally employed through State Best Management Practices (BMP's) further restrict herbicide's effects outside the boundaries of its application. On February 23 and 24, 2009 analysis of risk was performed for the chemicals glyphosate, hexazinone, imazapic, imazapyr, triclopyr amine, and triclopyr ester at the proposed rate of application in SERA risk assessments prepared for the USDA Forest Service (USDA 2006). In a variety of human health and environmental health scenarios (including a variety of wildlife scenarios) most Hazard Quotients (HQ) were projected to be below the Forest's maximum acceptable standard of 1.0. Application of mitigation measures shown previously in this document and adherence to Forest Standards for herbicide use and chemical labels for application will negate hazard quotients > 1.0 related to drift, accidental spills and run-off. Parameters and output from these analyses are available as part of the process record at the Pleasant Hill Ranger District Office, 2591 Highway 21, Clarksville, Arkansas 72830.

Glyphosate

This chemical is not soil active and has low toxicity to animals. Glyphosate: when contacting eyes is no more than slightly irritating based on toxicity studies; with skin contact is not more than slightly toxic and not more than slightly irritating based up toxicity studies; when ingested is no more than slightly toxic based on toxicity studies – with no significant adverse health effects expected if only small amounts (less than a mouthful) are swallowed; when inhaled is no more than slightly toxic based on toxicity studies (MSDS for Foresters' Non-Selective Herbicide dated 11/26/2008). Lab studies conducted specifically on bobwhite quail also demonstrate extremely low toxicity. Typical hazard quotients for foliar and cut-surface application for glyphosate to wildlife are less than 1.0.

Hexazinone

This chemical is soil active, and if not applied correctly has the ability to move off site. Use of chemical label application rates and application methods, Forest-Wide Standards and BMP's mitigate this potential.

Contact with hexazinone may cause corneal opacity or clouding of the eye and skin irritation/rash on the skin. Based on animal data, ingestion of large amounts of hexazinone may cause effects on the liver. Significant skin permeation and systemic toxicity after contact appears unlikely (MSDS for Velpar L dated 11/4/2010). Hexazinone is practically non-toxic to fish, fresh water invertebrates and mollusks, and is slightly toxic to crustaceans. When hexazinone is ingested by animals, it is broken down into metabolites which are rapidly excreted in the urine and feces. Hexazinone does not accumulate in the tissues of exposed animals (USDA, 2012).

Typical hazard quotients associated with soil application of hexazinone for wildlife are less than 1.0, with the exception of the longer-term (90 days) exposure of a large mammal to contaminated vegetation on site (see process record for specific numbers). These upper bound HQ's are not a concern because:

- The scenario assumes a diet composed of 100% contaminated vegetation or insects from the site which is highly unlikely. The long-term HQ assumes that vegetation is consumed on the same site for 90 days which is also unlikely.
- The HQ's deal with individuals, not populations.

Imazapic

This chemical is weakly adsorbed in basic soils, but adsorption increases in acidic soils. Field studies have not shown movement of this chemical in surface water. This herbicide has low toxicity to animals. There is a high probability that imazapic is not acutely harmful to aquatic invertebrates, aquatic plants or fish. In addition, this chemical is non-irritating with exposure to skin and eyes (MSDS for Plateau dated 3/5/2012). Hazard quotients calculated for risk to terrestrial wildlife are all less than 1.0 (see process record for specific numbers).

Imazapyr

Imazapyr is soil active, but mobility in soil is relatively low. It can be soil active particularly during spring leaf expansion. Application after mid-September may yield soil activity the following spring. This chemical has very low toxicity to mammals or other animals. It may cause slight but temporary irritation to the eyes and skin if exposure occurs (MSDS for Arsenal AC dated 6/15/2009). All HQ's for imazapyr are well under 1.0, (see process record for specific numbers) with the exception of effects to aquatic plants. Any non-target plants, if occurring in proximity to treated plants, could be killed and this could indirectly affect habitat for wildlife on a very small scale.

Triclopyr Amine and Triclopyr Ester

Triclopyr is not soil active, except in examples of spills or misapplications not in accordance with label application rates. These chemicals have low bioconcentration potential and single-dose toxicity to mammals is low although prolonged or repeated exposure may cause skin irritation in mammals and corneal damage if introduced into the eyes (MSDS for Element 3A Herbicide dated 5/25/2011). Typical hazard quotients associated with both foliar and cut-surface application of triclopyr for wildlife are less than 1.0, with the exception of the longer-term (90 days) exposure of a large mammal to contaminated vegetation on-site (see process record for specific numbers). These upper bound HQ's are not a concern because:

- The scenario assumes a diet composed of 100% contaminated vegetation or insects from the site which is highly unlikely. The long-term HQ assumes that vegetation is consumed on the same site for 90 days which is also unlikely.
- The HQ's deal with individuals, not populations.
- The amount of non-target vegetation subject to spray deposition is small. The average half-life of this chemical is 30 days; degraded by both soil microbes and photolysis. The concern that large animals would eat contaminated vegetation for 90 days in field conditions is further reduced by the average half-life of this chemical.
- Herbicide treatments occur on an infrequent basis in project areas – with applications usually separated by multiple years.

On occasion it is more effective for the herbicides to be mixed together. For example, when trying to eradicate fescue, mixtures of Glyphosate and Imazapyr are recommended. Timber stands occasionally may require mixing Triclopyr and Imazapyr, or Glyphosate and Imazapyr to control red maple. Additionally, in order to improve the success of herbicide (foliar)

applications, a surfactant (Cide-Kick, Cide-Kick II, JLB Oil Plus, JLB Oil and Red River 90) may be mixed with the above-mentioned herbicides. These are non-ionic surfactants. They are added to aid the chemical in adhering to the leaf's surface. Active ingredients for surfactants used by the District are:

Red River 90- Alkylarpolyoxethylene, glycols, and free fatty acids.
Cide-Kick – D'limonene, related isomers, and emulsifiers (citrus oil)
Cide-Kick II – D'limonene, related isomers, and emulsifiers (pine oil)
JLB Oil Plus – vegetable and limonene oil
JLB Oil- processed petroleum oil and limonene emulsifiers

Direct, Indirect, and Cumulative Effects

Direct effects, occurring at time of application, to birds or large mammals are unlikely, since these species are likely to move from the area when project activities are implemented. Although direct effects to amphibians are more likely since contact with herbicide could be absorbed through the skin, amphibians are likely to be under logs, rocks or leaves, making direct contact (from spray) with chemicals less likely. Direct effects to other non-target plants occurring in these habitats could occur. Application methods, including direct application to target foliage or to freshly cut stumps, would minimize the possibility for spills and/or direct contamination to non-target species.

Indirect effects to Management Indicator Species (MIS) birds or mammals could occur if these species were to ingest foliage or seeds contaminated with any of the chemicals proposed for use or dermal contact with treated plants. However, none of the chemicals would bioaccumulate in organisms. Indirect effects to MIS and habitats treated with all chemicals are reduced given that applicators treat target plants only and that mitigation measures and forest-wide standards will be used.

There are likely to be few negative cumulative effects to MIS species over time as a result of implementing alternatives 2 or 3. None of the herbicides proposed for use will bioaccumulate or have lengthy half-lives in the environment. Related to cumulative impacts, the Pleasant Hill District is authorized under a previous NEPA analysis to apply herbicide districtwide on up to 500 acres annually to treat non-native invasive species (NNIS). Realistically, for the reasonably foreseeable future this may amount to 200 acres of herbicide treatment in the analysis area for NNIS over the next five years. In addition, no other herbicide projects are known from the Ozark National Forest or the vicinity at present, though some herbicide use is likely to occur on private lands particularly in association with agricultural production. Efforts to maintain early-seral habitat and restore herbaceous species biodiversity in woodlands, and TSI treatments to benefit hard mast-producing species are also likely to cumulatively benefit associated MIS species.

The past and proposed use of herbicides would have no negative direct, indirect or cumulative effects on water quality or wildlife with adherence to Forest Wide Standards FW19 - FW 32 (USDA, 2005). Proposed herbicide use would have beneficial effects on species using early-successional habitat by allowing creation and maintenance of wildlife openings, reduction of overstory and midstory canopy in WSI areas, and promoting oak and pine regeneration through TSI cultural practices.

Implementation of Alternative 3 (reduced herbicide use) would not provide the level of indirect benefits to wildlife as would be expected with implementation of Alternative 2. Reduction of herbicide use would reduce the levels of early-successional habitat, reduce diversity of herbaceous species in woodland restoration areas and reduce the promotion of oak/pine regeneration – below levels which would be expected with implementation of Alternative 2.

6. Forest Improvements (Road Access):

Existing Condition

This analysis area is located in Johnson & Madison County. There are a total of roughly 55 miles of roads within and around the analysis area; county roads comprise approximately 20 miles around the Pea Prong analysis area. These roads are regularly maintained by the County and Forest Service. Existing road locations shown on the maps have been identified using GPS (Global Positioning System) equipment. Currently, the total road density is 3.2 miles of road per square mile. Road density under National Forest jurisdiction is 1.86 miles per square mile.

Direct, Indirect, and Cumulative Effects

Alternative 1

Primary arterial roads would be maintained at their current level. However, revenues from timber sales would not be generated to aid in road maintenance.

Several of the roads which are currently open would remain so, and would continue to be maintained on a regular basis with implementation of the "no action" alternative. These roads are currently classed as maintenance level 2 or 3 and are maintained for the public to reach private residences or allow for administrative access. However, forest interior roads in need of maintenance or rehabilitation would continue to erode and contribute to sedimentation of creeks and streams. Some of these roads are classified as maintenance level 1.

Alternatives 2 & 3

A transportation analysis was completed for this project to inform this environmental assessment. It identified and considered values associated with or impacted by the existing road system and all proposed roadwork. Consideration was given to long-term road funding opportunities and obligations.

Proposed timber harvesting activities will require reconstruction and maintenance of open and closed roads. Descriptive statements of the roadwork to be conducted are given on page 14 of this EA. Specific roadwork for Alternative 2 is given in Table 2 and locations shown on the map. Specific locations for the construction work were determined using GPS equipment. The effects of roadwork on soil erosion and water quality are considered in the Soil and Water sections and other effects in the Wildlife and Social Sections of this EA.

All roads proposed for this project will average less than ten percent slope, with some short sections slightly greater than 10 percent.

Maintenance on approximately 22 miles of open and closed roads will be performed in this project to get the roads in a suitable condition for hauling timber across them. Maintenance consists of spot blading and graveling. County roads that will be used are regularly maintained by their respective counties. Special cooperative agreements are in place to assist in any required maintenance resulting from logging operations. Several maintenance level 1 and 2 roads that were previously closed will be re-closed with gates/berms to reduce erosion and protect resources. The Forest Service Manual states that level 1 roads are to be closed to motorized traffic when management activities are complete.

Reconstruction on approximately 16.1 miles of roads is proposed (94460A, 94461A & B, 94462A, 94488A, 94495A & B, 94667A, 1508B, 1526, 1540, and 1540A). These roads are not maintained on a regular basis thus requiring more work than the roads that require maintenance. Up-grading these roads by installing wing-ditches, gravel, and rolling dips will stabilize them, thus minimizing sediment delivery to streams and drainages.

Approximately 13.3 miles of existing roads no longer needed for management or access are proposed for decommissioning. Decommissioning roads involves restoring roads by allowing them to blend back in to the general forest area. Activities used to decommission a road include, but are not limited to, the following: reestablishing former drainage patterns, stabilizing slopes, restoring vegetation, blocking the entrance to the road, installing water bars (earthen mounds), and removing culverts. These activities are designed to completely eliminate the roadbed by restoring natural conditions. Unnamed and illegally accessed OHV trails that are present in the project area may be closed using debris, rocks, earthen mounds, or gates.

An inventory of all existing roads was completed and locations were obtained using global positioning system (GPS) equipment. Several "outlaw" trails were identified as well as old road templates not presently being used for administration purposes. Some of these have been decommissioned and/or closed in the past, but are still being used as renegade OHV trails.

Very few special-use permits exist on Forest roads in the project area. However, it is fairly likely that the Forest Service will receive additional special-use proposals in the future to access private forest stands for commercial timber removal. The Forest Service will need to approach adjacent neighbors to work out agreements for accessing portions of National Forest lands in this area.

Gates will be installed on the short roads that access the new wildlife openings. This will amount to approximately 6 gates. Foot travel will still be invited on all roads in the project area.

The density of open roads will decrease under both Alternatives as all presently-closed roads will be re-closed upon completion of the project. Currently, total road density of roads per square mile is about 3.2 miles length/mile^2. Under Alternatives 2 & 3, the road density decreases to 2.45.

The auditory and visibility impacts of road-using equipment should be relatively short-lived with very little effect on the environment. Re-closure and decommissioning of roads would reduce erosion and improve water quality in the analysis area.

Based on the watershed analysis that evaluates roads' contribution of erosion and sediment in these two alternatives, rates of delivery are considered low risk.

7. Heritage Resources

Existing Condition

Information concerning possible heritage resources within the project area was obtained from the Master Site and Project Tracking Atlas, Arkansas Archeological Survey's site and project files, leads from field-going personnel, historical maps, aerial photographs, land acquisition files, local historical and genealogical societies, descendant family members, and project and site records at the Pleasant Hill Ranger District office and Supervisor's Office.

There have been 10 archeological projects conducted within or immediately adjacent to the proposed project area. Prior projects conducted include:

Project No.	Name
AMASDA56	Preliminary Reconnaisance of the Mulberry Creek Basin AR
90-10-04-01	Pleasant Hill Fuel Reduction Prescribed Burns
90-10-04-07	FY90 Firewood Areas
91-10-04-01	Pleasant Hill Fuel Reduction Prescribed Burns
91-10-04-10	Compartment 491 Borrow Pit
92-10-04-03	Wolf Pen Timber Sale
93-10-04-02	Spoke Plant Ranger Sale
95-10-04-03	Stickerlick Environmental Analysis
96-10-04-04	Harp Special Use Permit
05-10-04-01	Spoke Plant Environmental Assessment

(*) The Mulberry Creek Basin project was conducted by John House, Arkansas Archeological Survey. Other projects listed above were USDA Forest Service projects.

A total of 24 sites are located within or adjacent to the project area. Sixteen sites were recorded prior to 2011, and an additional eight sites were located and recorded during fieldwork in 2011-2012. The project report for the Pea Prong project (12-10-04-01) was submitted to the Arkansas State Historic Preservation Officer (SHPO) in June of 2012 and concurrence was received from the SHPO on July 9, 2012.

Of the total 24 sites within or adjacent to the project area, 2 are recommended eligible for the National Register of Historic Places, 21 sites are of undetermined eligibility, and 1 site is recommended not eligible. Sites recommended eligible and those with undetermined eligibility will be protected from any ground-disturbing activities associated with this project. No protection is required for sites recommended not eligible.

Six prehistoric sites, including a bluff shelter and five lithics scatters, are located within or near the project area. Five of the six prehistoric sites are recommended undetermined for eligibility to the National Register and will be protected from any ground-disturbing activities associated with this project. The sixth prehistoric site is a bluff shelter, and is recommended as eligible for the National Register.

Fourteen historic sites are located within or near the project area. These include a cemetery, houseplaces, wells, and old fields recorded based on GLO maps. One historic site, The Weatherby Family Cemetery (3JO730), is recommended eligible for nomination to the National Register. This is a small cemetery, containing only four graves. The Weatherby family was among the early Euro-American pioneer settlers in the area. Numerous houseplaces have partially standing structures. Thirteen historic sites are recommended undetermined, and one historic site is recommended not eligible. Sites recommended eligible for nomination and sites with undetermined eligibility will be protected from any ground-disturbing activities associated with this project. Sites determined not eligible warrant no protection.

Three sites with both prehistoric and historic components are located within or near the project area. Two are historic houseplaces from which prehistoric lithics were recovered. The third is principally a lithic scatter, in the proximity of historic rock fence remnants. They are recommended undetermined for nomination to the National Register, and will be protected from any ground-disturbing activities associated with this project.

EFFECTS OF ALTERNATIVE ACTIONS

Alternative 1

This alternative would have no effect on heritage resources. No additional surveys will be conducted. No sites will be addressed for their National Register of Historic Places eligibility.

Alternatives 2 and 3

As noted above, 24 sites were recorded or re-evaluated during fieldwork in 2011 and 2012. The project has been designed so that all sites that may be eligible for the National Register of Historic Places, or that are of undetermined eligibility, lie outside any of the project's areas of planned ground-disturbing activity. Rock alignments associated with historical farmstead sites and the extensive cleared and plowed fields surrounding them will be avoided by ground-disturbing activities. Historic site areas which contain no organic cultural material will undergo prescribed burning. Past research has shown that sites such as these will not be affected by a low-intensity prescribed burn.

Should any additional sites be found during project implementation, they will be examined by a professional archeologist (mitigation measure 3), who will prescribe necessary mitigation measures.

Based on these findings, all sites will be preserved intact and no significant effects will be produced upon significant historical or prehistoric sites that may be eligible for nomination to the National Register of Historic Places.

8. Vegetation Resources and Vegetation Diversity

Existing Condition

The Pea Prong project area is situated within the Boston Mountain eco-region located in the central part of the Ozark National Forest. Historically, the lands that are now the Ozark National Forest consisted of fire-dependent woodland and forest ecosystems with well-developed herbaceous understories. There was a more frequent regime of vegetation disturbance from anthropogenic fire than what has been common since the early 1900's. Early travelers in the Ozarks reported that Native Americans burned the woods on a regular basis. Frequent fire in forest/woodland ecosystems would invariably have produced open, less dense stands with a higher proportion of vegetation adapted to fire. Mean fire-return interval from 1680-1820 ranged from 4.6 to 16 years, from 1821-1880 mean fire-return interval ranged from 2 to 3.1 years and for the period of 1881-1920 it ranged from 1.4 to 5 years. From 1921-2000 mean fire-return interval for these area ranged from 62-80 years (Guyette and Spetich, 2003).

Native-American fires and natural fires more than likely occurred periodically, long before European settlement and, along with other factors, greatly influenced the development and structure of the pine and hardwood forests that existed when the first settlers arrived in the Ozarks. Historian Steven Pyne (2001):

> The modification of the American continent by fire… was the result of repeated, controlled surface burns on a cycle of one to three years, broken by occasional holocausts from escaped fires and periodic conflagrations during times of drought. Even under ideal circumstances, accidents occurred: signal fires escaped and campfires spread… So extensive were the cumulative effects of these modifications that it may be said that the general consequence of the Indian occupation of the New World was to replace forested lands with grassland or savannah, or, where the forest persisted, to open it up and free it from underbrush. Most of the impenetrable woods encountered by explorers were in bogs or swamps from which fire was excluded; naturally drained landscape was nearly everywhere burned. Conversely, almost wherever the European went, forests followed. The Great American Forest may be more a product of settlement than a victim of it.

Review of historical fire records from 1930 to 1958 from the Pleasant Hill District (located in District Files) indicates that lightning had been a source of ignition and averaged around 4 fire occurrences per year. In 1936, lightning started 20 fires during the very dry summer and early fall months (rainfall less than half normal) across the District. Up until the last 10-15 years, wildfires have largely been excluded from the project area due to an aggressive fire suppression program. This has allowed stem density to increase significantly in areas previously maintained in more open stand conditions by recurring fire. In addition, this has allowed shade-tolerant and fire-intolerant tree species such as red maple and American beech to become more common in the understory. These species would likely become more dominant in future stand composition and oaks, which are shade-intolerant and fire-tolerant, would decrease.

Displacement of anthropogenic fire, creation of barriers to fire such as roads and a long standing policy of fire suppression have led to higher forest health risks and problems due to abnormally dense forest conditions and unsustainable ecosystems. Existing ecological conditions in the project area include a dense, overstocked forest; a shift from the historic plant community composition toward fire-intolerant plant species; lack of herbaceous species diversity and insect epidemics.

Most of the Ozarks, prior to National Forest acquisition, was extensively harvested for lumber and pulpwood during the early 1900's. Much of the hardwood forestlands were heavily logged for railroad ties and barrels in the early part of the twentieth century. Small acreage farms were settled along floodplains and flat ridges in the late 1800's and early 1900's, many of which were abandoned and later acquired or purchased by the Forest Service. Much of these acquired lands were then planted with shortleaf pine. Chestnut blight removed Ozark chinquapin, a common midstory/overstory species, during the 1920's and 30's. Settlers periodically burned the areas to control insect pests and improve grazing. Prior to this, the vegetative changes occurred because of natural effects (herbivore grazing, wind, disease, and wildfire) and Native American fires. Heavy cutting from the late 1800's to the 1930's combined with land clearing and periodic burning by settlers and the occasional lightning and Native-American fires described above, and cattle and hog use, greatly influenced the ecological conditions that favored the development of the forests that now exist in the project area.

Forest disease has become of paramount importance on the Ozark National Forest within the past decade. A red oak borer epidemic materialized with affected acreage going from 19,000 acres in 1999 to around 300,000 acres in 2001. Preliminary field investigations indicate that the red oak component of the forest was being reduced by as much as 85% within the affected areas. Incidents of infestation leveled off in 2004-05 and have continued to decline. A Jumping Gall Wasp population eruption occurred in spring 2010. It affected White Oaks across the forest by defoliating the leaves. Mild drought conditions followed that summer, then severe drought in 2011 killed several stands of White Oak. This summer (2012) is turning into one of the worst droughts on record. This project is in the part of Arkansas that has been categorized as in an "exceptional" drought condition. Weather forecasts indicate this area would need 15 inches of rain between July and September to make up the deficit. Weather predictions for that to happen are dim.

Vegetative management to reduce density would serve to lower the risk to possible future insect/disease outbreaks. The most effective preventive strategy is to use regeneration, thinning, and salvage harvests that would reduce inter-tree competition and relieve water stress on remaining trees. The stump sprouts from cut trees would help provide a source of young oaks for the future stand.

Another forest health issue in the project area includes non-native invasive species such as Nepalese brown top grass, Chinese lespedeza, Mimosa, and Tree-of-Heaven (*Ailanthus*). These forest health issues and their treatments are covered in detail in a district wide EA done in 2009 called Pleasant Hill Wildlife Habitat Improvement Projects.

Timber harvesting, land clearing, and other uses (especially hog and cattle grazing) from pioneer days to present have developed a somewhat diverse and fragmented ecosystem across the Pea Prong project vicinity. Farming continues on some private lands with the maintenance of pasture and some crop acreage on the mountaintops and along the Little Mulberry River. Streams and drains within the project area have riparian ecosystems of varying widths which provide additional vegetative diversity. Privately-owned land comprises significant blocks around the project area. This area varies from improved pastures to heavy woods.

The compartments for which vegetation was analyzed contain approximately 8,608 acres of National Forest land, of which 8,557 acres are suitable timber-producing lands. The project area consists of pine timber types (3%) and hardwood timber types (97%). Currently, the project area does not have a balanced age-class with 85% of stands being over 80 years old (Table 5). National Forest lands in the project area exhibit the following age-class distributions:

Table 5. Current Age-Class distribution in Pea Prong project area on Public Land.

All - Age-classes by Timber Type								
Ages-Classes	**0-20**	**21-40**	**41-60**	**61-80**	**81-100**	**100+**	**Total Acres**	**%**
Pine/Cedar Acres		168	81	41			**290**	**3**
Hdwd Acres	21	729	16	254	6479	819	**8318**	**97**
Total Acres	**21**	**897**	**97**	**295**	**6479**	**819**	**8608**	
% of Total Acres (USFS)	<1	10	1	3	75	10		100

***Total acreages may vary slightly from those mentioned previously based on rounding computations.**

Current conditions and characteristics of stands proposed for timber harvesting and other silvicultural activities are listed in Appendix A.

The Pea Prong project has approximately 51 acres (<1%) that are currently classified as unsuitable for timber production. There are about 2,895 acres (34%) that have been designated for old-growth forest management status.

Direct, Indirect, and Cumulative Effects

Alternative 1

This alternative would allow another 239 acres (3% -- acres of 70+ yrs. old) to move up into the >80 year old age-class, comprising a total of 88% of the project area. The health of dense, older timber stands needing treatment would continue to decline and they would become more susceptible to insects and disease. Potential productivity and/or wood volume would decrease as a result of increased competition and mortality. This alternative would not meet the desired future condition as listed in the Forest Plan and would forego the opportunity to restore oak and pine forestlands. This alternative does not address the stated purpose and needs of this project.

There would be a cumulative effect of late-successional, shade-tolerant species (such as maple and beech) replacing the early-successional, more shade-intolerant species (such as oaks) at all canopy levels and in the understory. Old fields that have been planted with pine and naturally-occurring pine areas would eventually be replaced by hardwood that currently exists in the understory/midstory of these stands. Most of the timber and wildlife outputs identified in LRMP would not be gained in the Pea Prong project area.

Alternative 2

The estimated hardwood volume produced by this alternative would be 14,249 CCF of sawtimber. The estimated pine volume produced would be 2,097 CCF of sawtimber (CCF= one hundred cubic feet).

The effects of Hardwood Shelterwood harvests would be the replacement of mature even-aged stands with immature even-aged stands containing stump-sprouts, naturally-seeded saplings and seedlings. A partial component of the original mature stands will be retained for genetic stock and to give shelter to the young, natural regeneration. These harvest methods meet the guidelines and objectives set out in the LRMP. They are appropriate methods because the hardwood trees have reached mature age, exhibit good acorn-bearing characteristics, and are located on soils suitable for natural regeneration. Artificial regeneration (planting) would occur if desired stocking levels are not met by natural means.

Treating some of the remaining non-merchantable hardwood/pine with herbicides in the shelterwood areas that are not needed for wildlife and other purposes, will let light reach the forest floor, and allow stump/root-sprouting and acorns to germinate in these areas. In the short term, the stands will be more open and early-seral vegetation will develop across the area. Within ten years, the understory will be very dense and emerging into midstory status.

The effects of Timber Stand Improvement treatments in pine and hardwood and Pre-commercial Thinning on hardwood using handtools and/or herbicide would allow favored trees to gain dominance or get a good growth jump to stay ahead of its competitors. Stocking (density) would be reduced to eliminate competition of desirable species and would allow more light penetration for more herbaceous vegetation. Forest-wide Standards mentioned on pp. 26-28 will be followed during implementation of timber treatments using herbicides near streams (e.g., Little Mulberry Creek) in order to avoid negative impacts. Additional discussion regarding timber treatments near Wild and Scenic Rivers can be found in Section 13 of the EA, Management Areas, Scenery Management and Recreation. The effects of the follow-up burning would replace woody, brushy vegetation with more desirable regeneration that would fully occupy the sites. Interplanting of pine seedlings by hand would occur after PCT practices take place on one pine stand.

Pine Thinning would occur on 233 acres and hardwood thinning on 883 acres. Its effects would increase vigor & growth of residual trees, reduce the susceptibility of the stand to insect and disease, and improve habitat for wildlife. Densities would be reduced for more penetrating views; more herbaceous and brushy vegetation would ensue for more wildlife species benefits, especially after midstory control measures of TSI (handtool/herbicide) and burning occur.

The stands would be thinned to a target basal area of 60-70 ft^2/acre. Trees that are suppressed or that have poor form would be targeted for removal. Trees of good form and/or close to the correct spacing would be favored over trees that are simply of larger size. The target spacing would depend on the average diameter of the trees of the stand. More light would reach the forest floor, thereby increasing herbaceous vegetation.

The effects of hardwood Timber Stand Improvement (TSI) in 14 hardwood stands, roughly 748 acres, would be similar to the harvest thinning of the pine and hardwood mentioned above. Stocking levels will be reduced to allow light penetration to the forest floor to initiate more herbaceous vegetation and to alleviate competition for light and moisture of the remaining trees.

The effects of Oak Woodland Thinning on about 660 acres would open the stands even more than the pine and hardwood thinning. The stocking levels would be reduced to about 40 ft^2/acre so that more grass-like species can be established and more hard and soft tree-mast is more fruitful. This would also bring back forest conditions reminiscent of the pre-settlement era.

The effects of Prescribed Burning on federal land and private land (with landowner's consent) will be the replacement of brushy and woody vegetation in the understory to a more grass and forb composition, benefiting quail, deer, and neo-tropical migratory birds, on balance. Oak & Pine regeneration would be encouraged, fuel accumulations would be reduced, risk of wildfire would decrease, and an increase in favorable habitat for historical fire-tolerant vegetation species would occur.

The effects of eliminating Non-Native Invasive Species (NNIS: <500 acres) would restore natural, historically endemic vegetation, as well as faunal and avian species that once thrived in pre-settlement times.

The effects of creating scattered wildlife openings (6 areas = 43 acres) by dozer/herbicide would be the replacement of a moderately-dense overstory with a variety of grasses and forbs that would be suitable for forage by ground-dwelling animals.

Riparian Stand Improvement (RSI) effects will approximate a light thinning near watercourses. Occasional trees in the floodplain will be cut to mimic dead-falls and downed trees to further stabilize the riparian zone when flood events occur. Residual trees will be strengthened by less competition and more able to withstand rising water levels. Hickory (especially shagbark for bats), walnut, and oaks for wildlife will be the favored species to be left. The second focus would be on keeping other riparian-dependent species like sycamore, birch, ash, and sweet gum. This would be done in stands in Compartment 488, 460, and 494 along Friley Creek. Trees within twenty feet of the bank of the stream would not be cut. At least 8 to 20 trees per mile greater than 20 inches in diameter would be cut and fallen into the stream channel to improve stream habitat. Lastly, by thinning the overstory it would allow midstory species like native cane to potentially reestablish within the project area bringing back this rare community and associated wildlife. Cane was historically very dominant in riparian areas within the Forest.

Heavy site preparation measures are needed to restore old-field pine on 30 acres. Its effects will be the replacement of low-quality hardwood trees, brush, vines, and briars with pine seedlings that will serve as thermal cover for wildlife and provide biodiversity to a predominantly hardwood region.

The cumulative effects from all actions proposed in Alternative 2 (& 3) on vegetative diversity of the project area, relative to the no-action alternative, are shown below:

Table 6. Effect of vegetative diversity changes under Alt. 2 & 3 timber harvesting actions (acres).

Forest Type	Within-Stand Diversity (Thinnings)	Between-Stand Diversity (Even-Aged Management)
Hardwood	1,493	1,122
Pine	233	0

Implementation of this alternative is not expected to have a negative cumulative impact on vegetation. The forest condition would be improved and left in a more sustainable condition. Risk of insect/disease outbreaks would decrease and growth of residual trees would increase. Also, potential old-growth would not decrease in the project area.

Alternative 3

The effects of implementing Alternative 3 would be similar to the effects mentioned above for Alternative 2. Eliminating the use of foliar herbicides and replacing it with handtools (i.e., chainsaws, machetes, etc.) would slow the process of regenerating the desirable species. When using handtools to eliminate the undesirable species within a treatment area, only those undesirables that are 24-inches or taller would be cut. Everything less than 24 inches would remain, thereby leaving the treatment area inhabited with undesirable species that could out-compete the desirable species. If herbicides were used, the less than 24-inch undesirables would be treated and would more than likely be relegated to non-competitive status. Additionally, herbicides severely retard stump-sprouting. When only using handtools to cut undesirables, stump-sprouting will almost always occur, thus causing the desirable species to struggle against formidable competition for sunlight.

This alternative proposes less Rx burning per day (i.e., fewer than 1,500 acres/day). Smoke and fireline management will be easier and more controllable. However, additional miles of fireline may be needed to restrict burning size; this may contribute more sediment into water sources, endangering aquatic biota.

Based on this analysis, the implementation of this alternative could have a negative cumulative impact on human worker resources because of the additional acres of handtool work and more sediment due to additional firelines.

9. Wildlife Resources

Existing Condition

Wildlife, fish and plant species and their habitats in the project area are managed in cooperation with the Arkansas Game and Fish Commission (AG&F), and the Arkansas Natural Heritage Commission (ARNHC). The state wildlife management agencies main responsibilities are to set policy for hunting and fishing regulations and law enforcement programs. The Natural Heritage Commission is responsible for collecting and maintaining information on rare plants, animals and natural communities in Arkansas. The Forest Service is responsible for managing fish and wildlife habitat conditions on National Forest lands. The following discussion focuses on the habitat conditions that support wildlife populations and fisheries.

The aquatic fauna in the project area is very diverse. The richness and diversity of this area is the result of several factors including long geological history of favorable climates and habitats, a lack of glaciation during the Pleistocene era, and a wide variety of aquatic habitats in the Boston Mountain eco-region. The streams within the eco-region are typically clear, extremely high gradient, and riffle and pool habitat dominated systems with gravel, cobble, boulder, and bedrock dominated substrates of sandstone, shale, and limestone. The Boston Mountain eco-region does not have as many karst features as some of the other eco-regions

in this part of Arkansas, but there are still many caves, springs, and seeps within the system. Streams within the Boston Mountain eco-region are classified as nutrient-poor systems with much of the energy derived from an allochthonous (carbon sources & other nutrients that come from outside the native aquatic system) food chain.

The diversity of wildlife species within this project area is typical of the Boston Mountains of the Ozark Plateau (USDA, 1990).

Wildlife habitat has been altered by the oak decline phenomenon, particularly the red oak borer infestation. Progression of oak decline on the District is resulting in habitat changes which could include a long-term reduction in hard-mast production, an increase in the amount of soft-mast production as non-oaks make up more of the overstory, and a short-term higher density of snags and down trees.

The Pleasant Hill District reflects conditions that are seen Forest-wide in relation to age-classes of forest stands. The project analysis area contains a high proportion of late-seral wildlife habitat, and lacks open woodland capable of supporting diverse understory grass and herbaceous vegetation.

Under the National Forest Management Act (NFMA) regulations, adopted in 1982, selection of management indicator species (MIS) during development of forest plans is required (36 CFR 219.19 [a]). Management Indicator Species (MIS) are selected "because their population changes are believed to indicate the effects of management activities" (36 CFR 219.19 [a] [1]). They are used during planning to help compare effects of alternatives (36 CFR 219.19 [a] [2]) and as a focus for monitoring.

Table 7. MIS Species, Habitat Requirements and Population Trends

Species	MIS Type	Habitat Requirements	Population Trend
Northern bobwhite	ecological indicator	pine and oak woodland and native grasslands	decreasing
Whitetail deer	demand	mosaic of forest age-classes	stable to increasing*
Black bear	demand	remote habitat with mature forest component with intermixed 0-5 year old regeneration	stable to increasing*
Wild turkey	demand	mature forest with open areas containing grasses/forbs/soft mast	stable to decreasing*
Prairie warbler	ecological indicator	regenerating forest communities	decreasing
Brown-headed nuthatch	ecological indicator	open pine forest and woodlands	stable to decreasing
Cerulean warbler	ecological indicator	communities associated with mature hardwood forest with complex canopy structures, and dry-mesic oak Forest communities	stable to decreasing
Northern parula	ecological indicator	communities associated with forests in riparian areas	stable
Ovenbird	ecological indicator	dry-mesic oak forests	stable to increasing
Red-headed woodpecker	ecological indicator	oak woodland overstories	stable to decreasing
Pileated woodpecker	ecological indicator	large snags	stable to increasing
Scarlet tanager	ecological indicator	mature dry-mesic oak forest communities	stable
Acadian flycatcher	ecological indicator	mature mesic hardwood forest communities	stable to increasing
Smallmouth bass	demand	cool water stream communities	increasing
Largemouth bass	demand	quality pond and lake habitat	stable

*information from AGFC harvest data

Table 7 shows Ozark National Forest MIS species pertinent to the Pleasant Hill Ranger District, the habitat type they represent and population trends (AGFC 2001, 2006 & 2007, USDA 2001, USDA 2007 and NatureServe 2010). From the Forest MIS list, 15 species have potential habitat based on occurrence records and/or habitat requirements within the analysis area and will be addressed.

In 1996, the Southern Region of the USDA Forest Service adopted "The Southern National Forest's Migrant and Resident Landbird Conservation Strategy" (Gaines and Morris 1996) to improve monitoring, research, and management programs affecting forest birds and their habitats. A region wide program of monitoring avian populations based on point-counts was initiated as part of this strategy. The results of this monitoring effort are reported in General Technical Report – NRS-9 (USDA, 2007), and summarized for MIS avian species on the Ozark National Forest in supporting documentation (Taylor, 2010). Data collected from 1992 to 2004 is utilized. Sampling strategy and point-count methodology is described in detail in Gaines and Morris (1996).

The project area is a mature forest matrix generally composed of an oak-hickory sub-matrix and a shortleaf pine sub-matrix. Approximately 97% of the public lands in the project area are composed of hardwood/hardwood – pine forest types. Pine forest types comprise

approximately 3% of the project area. Grassland/open areas on Federal lands in the analysis area comprise less than 1% of the total area, primarily consisting of permanently maintained wildlife openings, powerline right of ways, and roadsides.

Currently on federal lands, approximately 95% of the project area forest is composed of hardwood/hardwood-pine forest types of an age capable of producing abundant hard mast for wildlife (age classes 41+ years). Approximately 5% of the project area forest is composed of hardwood forest types in young age classes, not capable of extensive mast production (age classes less than 41 years).

Hard mast capability is well distributed across the landscape. The majority of the project area's hardwood forest types are currently of mast-producing age. These age classes are those which are 41+ years of age. These stands are found within stream corridors and on all aspects with the best representation found on the north and east slopes. Mast-producing trees are also represented within the shortleaf pine sub-matrix, but to a lesser degree.

The mast needs of many forest animals are met when at least 20 percent of 640 acres (one square mile) is occupied by well-distributed mast-producing hardwood trees (Wildlife Habitat Management Handbook, 204.1).

The majority of pine forest types in the project area are currently in age class 21-40 years of age (approximately 58% of the pine acres). These stands are represented on all aspects and elevations.

At present, less than 1% of the public lands in the project area (forest and woodlands) are in an early-seral condition (1-20 years of age).

The project area reflects conditions that are seen Forest wide in relation to age-classes of forest stands. The project area contains a high proportion of late-seral wildlife habitat, and lacks open woodland capable of supporting diverse understory grass and herbaceous vegetation.

Table 8. Forest Age Class Distribution by Alternative (public lands)

Age Classes (years)	Alternative 1 (acres/% total)	Alternatives 2 &3 (acres/% total)
grass/forb*	approx. 30/<1%	73/1%
1-20	21/<1%	1143/13%
21-40	379/4%	369/4%
41-60	143/2%	120/1%
61-80	313/4%	313/4%
81-100	6,132/71%	5219/61%
101+	1,586/18%	1367/16%

* grass/forb acres are represented by existing road and utility right of ways, and existing and proposed wildlife openings

With implementation of Alternatives 2 or 3, approximately 1122 acres would be converted, through harvest and subsequent regeneration, from the 81-100+ year age classes to the 0-10 year age class. In addition, approximately 43 acres would be converted via construction and

enlargement of wildlife openings from the 21-40, 41-60 and 81-100+ year age classes to grass/forb habitat. Approximately 10 acres of the 21-40 year age class would be converted to wildlife openings/grass habitat, 23 acres of the 41-60 year age class would be converted to wildlife openings/grass habitat and 10 acres of the 81-100+ year age classes would be converted to wildlife openings/grass habitat. Browse and early-successional habitat would be provided in these regeneration areas and wildlife openings for a variety of wildlife species. Viability of disturbance-dependent avian species would be enhanced. Avian species requiring both large and small areas of early successional vegetation and forest edge would benefit. Implementation of the shelterwood regeneration system would result in 13% of the public land-base within the project area compartments in early-successional forest habitat, as opposed to <1% under current conditions. Construction of new wildlife openings and enlargement of existing wildlife openings would result in 1% of the public land-base within the project area being in grass/forb habitat, as opposed to <1% under current conditions.

Implementation of Alternatives 2 or 3 would result in an approximate 12% reduction of forest habitat that is greater than 81 years old (federal lands). Following implementation of this alternative, approximately 77% of the forested (both pine and hardwood) public land base within the project area compartments would remain in the 81-100+ year age classes. With implementation of Alternative 2 or 3, and taking into consideration recruitment of stands from the 61-80 year age class (approximately 313 acres or 4% of project area land base) in the next 1-20 years, as well as examination of distribution of stand age classes, fragmentation of interior forest habitat is not anticipated.

Direct, Indirect and Cumulative Effects

Alternative 1

Currently approved management actions would be maintained under this alternative.

Effects to wildlife and MIS from implementation of the no action alternative are analyzed in detail in a reference paper compiled by the Pleasant Hill Ranger District (Taylor, 2010). This paper is part of the project analysis file.

Timber Harvest and Wildlife Habitat Improvement.
Effects of implementation of the no action alternative are described in Taylor (2010), in relation to the subsections Early Successional Habitat, Soft Mast Production, and Hard Mast Production. Indirect beneficial effects to wildlife species dependent upon older seral stages, and habitat requirements associated with closed-canopy conditions would occur. Thinning to help restore woodland conditions and creation of wildlife openings to improve herbaceous diversity would not occur. Short term early-successional habitat in regenerated forest stands would not occur, thereby causing negative indirect effects to disturbance-dependent and early-successional obligate wildlife species. Lack of thinning and regeneration harvest would not allow for improved production of soft mast. Increases in abundance of soft mast, utilized by a variety of wildlife species as a reliable seasonal food source would not occur. Regeneration silvicultural treatments would not be implemented to provide age-class diversity and maintain oak in the ecosystem as a source of hard mast for wildlife species. Oak species would be expected to become a minor component of the forest ecosystem in the long term without significant forest stand disturbance or treatments that favor oak regeneration. This alternative would cause negative indirect impacts to wildlife species. Forest Plan (USDA, 2005) recommendations of diverse, high quality habitats supporting

well-distributed and viable populations of all native and desired non-native plants and animals would not be met. Natural disturbance regimes within terrestrial habitats providing a stable and sustained flow of both early- and late-successional habitats over time would not meet desired conditions for fish and wildlife habitat.

Timber Stand Improvement Practices

Timber stand improvement practices, silvicultural release and precommercial thinning practices, and planting of hardwoods in oak-poor areas would not occur. Lack of improvement of stands containing beneficial tree species for wildlife would not occur, thereby causing indirect adverse impacts.

Prescribed Fire

Prescribed fire would not be implemented in the project analysis area with adoption of this alternative. Benefits to wildlife from: sustaining oak in the ecosystem for hard mast production; restoring woodlands for increased herbaceous diversity and density; maintaining pine as a significant component in the ecosystem; and maintaining other fire-dependent or adapted species and habitats would not occur. Lack of use of prescribed fire would not allow for improved production of soft mast. Increases in abundance of soft mast utilized by a variety of wildlife species as a reliable seasonal food source would not occur. This would cause negative indirect impacts to wildlife species. Forest Plan (USDA, 2005) recommendations of diverse, high quality habitats supporting well-distributed and viable populations of all native and desired non-native plants and animals would not be met. Natural disturbance regimes within terrestrial habitats providing a stable and sustained flow of both early- and late-successional habitats over time would not meet desired conditions for fish and wildlife habitat.

Herbicide Use

Herbicide use is also an important tool for benefiting oak/pine regeneration, by reducing interspecies competition and providing for these species presence in the ecosystem in the long term. Without use of this tool, benefits to oak/pine regeneration would not occur.

Road Work

Road maintenance, road decommissioning and closure of roads to administrative use only would not occur. The "No Action" alternative would not serve to disconnect the road system from the stream network. Road maintenance at levels expected to occur with the action alternatives would not occur, thereby allowing entrainment of sedimentation to continue in creeks from poor quality roads. This would cause adverse indirect impacts to water quality and aquatic species. Open road density in the project area would remain status quo, thereby allowing potential erosion to cause adverse indirect impacts to water quality and aquatic species.

There would be no change short term in the amount of closed-canopy forest habitat from current levels under the No Action Alternative. Species requiring interior/closed canopy forest habitat would be expected to remain stable or increase within the project analysis area. Species requiring forest openings, edges between different successional stages, and herbaceous/shrub browse would be expected to remain stable or decrease long term within the project analysis area.

Habitat components would continue to be less than specified in the Forest Plan within the project analysis area. Objectives as described in the Forest Plan (USDA, 2005) for bobwhite quail, whitetail deer, eastern wild turkey, black bear and largemouth/smallmouth bass (OBJ.10, OBJ.11, OBJ. 12, OBJ. 13, and OBJ. 15 respectively) would not be met in the project analysis area with implementation of the no action alternative. The objective for non-native invasive species treatment (OBJ. 9) would not be met in the project analysis area. The objective for insect and disease management through thinning and regeneration of oak and pine (OBJ. 8) would not be met in the project analysis area.

Alternatives 2&3

Effects to wildlife and MIS from implementation of the action alternative are analyzed in detail in a reference paper compiled by the Pleasant Hill Ranger District (Taylor, 2010). This paper is part of the project analysis file.

Timber Harvest and Wildlife Habitat Improvement.

Effects of implementation of the action alternative are described in Taylor (2010), in relation to the subsections Early Successional Habitat, Soft Mast Production, and Hard Mast Production. Indirect negative effects to wildlife species dependent upon older seral stages and habitat requirements associated with closed canopy conditions would occur. Thinning to help restore woodland conditions and creation of wildlife openings to improve herbaceous diversity would cause positive indirect impacts to wildlife. Short-term early-successional habitat in regenerated forest stands would occur, thereby causing positive indirect effects to disturbance-dependent and early-successional obligate wildlife species. Use of thinning and regeneration harvest would improve production of soft mast. Increases in abundance of soft mast utilized by a variety of wildlife species as a reliable seasonal food source would occur. Regeneration silvicultural treatments would provide age-class diversity and maintain oak in the ecosystem as a source of hard mast for wildlife species. Regeneration silvicultural treatments would also provide early-seral stage browse for species requiring this habitat component. Oak species would be expected to be maintained as a component of the forest ecosystem in the long term. This alternative would cause positive indirect impacts to wildlife species. Diverse and high quality habitats supporting well-distributed and viable populations of all native and desired non-native plants and animals would meet desired conditions for fish and wildlife as specified in the Forest Plan (USDA, 2005). Disturbance regimes within terrestrial habitats providing a stable and sustained flow of both early and late-successional habitats over time would meet desired conditions for fish and wildlife habitat as specified in the Forest Plan (USDA, 2005).

Timber Stand Improvement Practices

These practices, which include release, pre-commercial thinning and tree planting are beneficial to wildlife in the long term. These practices provide indirect beneficial effects to wildlife by insuring long term perpetuation of hard mast-producing trees and shortleaf pine in the ecosystem. Benefits to wildlife would be expected to be greater with implementation of Alternative 2 as opposed to Alternative 3 (reduced herbicide use).

Herbicide Use

Herbicide use is an important tool often used in woodland restoration thinning and wildlife opening construction/maintenance to prevent sprouting of woody species and therefore allowing for greater understory herbaceous vegetation abundance and diversity. In addition, herbicide use for timber stand improvement (TSI) is an important tool for reducing

competition with selected hard and soft mast producing tree species. Furthermore, herbicide use is a tool of great importance in insuring oak and pine regeneration is adequate following shelterwood and seedtree regeneration systems. Woodland restoration thinning, wildlife opening construction, TSI and successful regeneration of oak species and shortleaf pine would produce greater vegetation diversity and associated positive effects to wildlife with use of herbicide. Use of herbicide as provided for in Alternative 2 would improve these management actions and produce better habitat conditions for wildlife than would implementation of Alternative 3 (reduced herbicide use).

Prescribed Fire

Implementation of prescribed fire may cause some direct mortality to small mammals and herpetofauna in the short-term. However, Kirkland (et.al. 1997) found that fire effects upon small mammals in oak-dominated forests are transitory. Quantitative differences between burned and unburned habitats were found to disappear within 8 months following the burn. Rapid recovery of populations of small mammals in burned forests may be due to the rapid regrowth of ground cover from surviving rootstocks. Research found there were few discernible differences in small mammal and herpetofauna populations between burned and control areas, supporting the contention that prescribed fire in the project area had little overall impact on the terrestrial vertebrate fauna. In addition, immediate impacts of the burn on small mammals are slight as many species exhibit varying degrees of fossorial habits (Ford et al., 1999). In a study within the upper piedmont of South Carolina, Kilpatrick (et. al. 2004) found that prescribed burning and thinning for fuel reduction had minimal effects on herpetofauna in upland pine plantations. Prescribed burning has been found to change the composition of woody species seedlings. Due to reduction in the number of shade-tolerant species from prescribed burning, greater equitability among tolerant and intolerant species seedlings occurred. Mechanical removal of understory vegetation followed by prescribed fire provided both greater equitability among species and higher levels of photosynthetically-active radiation reaching the forest floor (Dolan, 2004). Prescribed burning and sub-canopy removal are important tools in improving conditions for oak seedling establishment while reducing competition from shade-tolerant species. Shelterwood harvest followed by prescribed fire simulates the combined events of overstory disturbance followed by fire; these are related events that have shaped the composition of oak ecosystems for millennia (Van Lear, 2000). Limiting daily burns to 1,500 acres as provided for in Alternative 3, may increase days required to complete burns in the project area. With limited suitable days for prescribed burning annually, this may reduce the ability to complete prescribed burning within the project area. Positive benefits to wildlife from prescribed burning may be reduced. Implementation of Alternative 3 (reduced prescribed fire) may not be as beneficial to wildlife species as would implementation of Alternative 2.

Road Work

No negative long-term impacts to wildlife would occur through proposed road reconstruction, road maintenance or temporary roading. Closure of roads following use with gates/mounds would reduce disturbance to wildlife. Reconstruction and maintenance of roads would lead to improved water quality by reducing existing erosion through use of improved road design features. Application of BMP's and forest-wide standards (FW-72 – FW-76, FW-78, FW-79, FW-81, FW-82, and FW-87 – FW-90) will be utilized for all road related work (USDA, 2005). Un-maintained and unauthorized non-system roads are one of the most common sources of accelerated erosion on National Forest lands. The proposed action would serve to assist in "disconnecting" the road system from the stream network.

Road maintenance would help preclude entrainment of sedimentation in creeks from poor quality roads. This would cause positive indirect impacts to water quality and aquatic species. Open road density in the project area would in most cases be reduced by road decommissioning and closure of roads with gates – allowing administrative access only. This would serve to reduce potential erosion, providing positive indirect impacts to water quality and aquatic species. Gating areas, including some large blocks, would provide habitats for species sensitive to human disturbance and provide opportunity for more remote wildlife-related recreation opportunities.

In summary, alternatives 2 and 3 are predicted to have negative short-term impacts on 9 of 15 management indicator species analyzed. Negative impacts would be primarily short-term disturbance of individual animals and potential loss of nests. Viability of populations as a whole would not be reduced (Taylor, 2010).

The use of proposed management actions as described in this Environmental Assessment would be of long term benefit to MIS that rely upon forest ecosystems, particularly oak/pine ecosystems, for habitat. In summary, alternative 2 and 3 are predicted to have positive long-term effects on 15 of 15 management indicator species analyzed. Although some individual negative long term effects are predicted, populations of all MIS would be expected to remain viable in the Ozark Highlands and on the National Forest (Taylor, 2010).

10. Threatened, Endangered, Sensitive (TES) Species

Existing Condition

Forest Service Manual (FSM) Section 2672.41 requires a biological evaluation (BE) and/or biological assessment (BA) for all Forest Service planned, funded, executed, or permitted programs and activities. The objectives of this BE/BA are to: 1) ensure that Forest Service actions do not contribute to loss of viability of any native or desired non-native species or contribute to trends toward federal listing, 2) comply with the requirements of the Endangered Species Act (ESA) so that federal agencies do not jeopardize or adversely modify critical habitat (as defined in ESA) of federally listed species, and 3) provide a process and standard to ensure that threatened, endangered, proposed, and sensitive species receive full consideration in the decision-making process.

Federally-listed threatened and endangered species, species proposed for federal listing, and Southern Region sensitive species that may potentially be affected by this project were examined using the following existing available information:

1. Reviewing the list of TES plant and animal species known or likely to occur on the Ozark – St. Francis National Forest, and their habitat preferences. This review included the U.S. Fish and Wildlife Service current list of endangered, threatened, and proposed species for Arkansas as of Feb. 23, 2009 (USDI 2009), the forest-wide list as of Oct. 8, 2007 and the current Southern Region Sensitive Species list for the Forest, dated August 8, 2007 (list attached as Appendix A).

2. Consulting element occurrence records (EOR's) for TES species as maintained by the Arkansas Natural Heritage Program (ARNHP).

3. Consulting with individuals in the private and public sector who are knowledgeable about the area and its flora and/or fauna.

4. Reviewing sources listed in the reference portion of this report.

5. Reviewing the results of field surveys that have been conducted in the area.

Most TES species known to occur on the Forest have unique habitat requirements, such as glades, barrens, rock outcrops, bogs, caves, and natural ponds. Appendix A of the BE/BA lists all 63 TES species currently known or expected to occur on or near the Ozark – St. Francis National Forests. All species on the list were considered during the analysis for this project.

A "step down" process was followed to eliminate species from further analysis and focus on those species that may be affected by proposed project activities. Species not eliminated are then analyzed in greater detail. Results of this "step down" analysis process are displayed in the Occurrence Analysis Results (OAR) column of the table in Appendix A. First, the range of a species was considered. Species' ranges on the Forest are based on county records contained in such documents as An Atlas and Annotated List of the Vascular Plants of Arkansas, and NatureServe Explorer, but are refined further when additional information is available, such as more recent occurrences documented in scientific literature or in Natural Heritage databases. Many times, historic range information clearly indicates a species will not occur in the analysis area due to the restricted geographic distribution of most TES species. When the analysis area is outside a known species range, that species is eliminated from further consideration by being coded as OAR code "1" in the Appendix A table. For the remaining species, after this first step, results from past surveys, knowledge of the analysis area and potential for suitable habitat were considered.

These resources and information were compiled to produce a site-specific biological evaluation for this project (Taylor, 2012).

Species Identified as Being in the Action Area or Potentially Affected by the Action

From past field surveys and knowledge of the area, and given the proposed action, those species which are analyzed and discussed further in this document are those that: a) are found to be located in the activity area (OAR code "5"), b) were not seen during the survey(s), but possibly occur in the activity area based on habitat observed during the survey(s) or field survey was not conducted when species is recognizable (OAR code "6"), and c) aquatic species known or suspected downstream of the project/activity area, but where project effects will be immeasurable or insignificant (OAR code "7").

As a result of this process, the following species occur as documented by field surveys or may potentially occur in the activity area based on habitat observations:

OAR Code	Scientific Name	Common Name	Taxa	Status
7	*Percina nasuta*	Longnose darter	fish	Sensitive
6	*Haliaeetus leucocephalus*	Bald eagle	Bird	Sensitive
6	*Corynorhinus townsendii ingens*	Ozark big-eared bat	Mammal	Endangered
5	*Myotis grisescens*	Gray bat	Mammal	Endangered
6	*Myotis leibii*	Eastern small-footed bat	Mammal	Sensitive
6	*Myotis sodalis*	Indiana bat	Mammal	Endangered
6	*Lirceus bicuspicatus*	An isopod	Isopod	Sensitive
7	*Orconectes Williamsi*	William's crayfish	Crustacean	Sensitive
7	*Paduniella nearctica*	Nearctic paduniellan caddisfly	Insect	Sensitive
6	*Amorpha Ouachitensis*	Ouachita leadplant	Plant	Sensitive
6	*Callirhoe bushii*	Bush's poppymallow	Plant	Sensitive
5	*Castanea pumila var. ozarkensis*	Ozark chinquapin	Plant	Sensitive
5	*Cypripedium kentuckiense*	Southern lady's slipper	Plant	Sensitive
6	*Delphinium newtonianum*	Moore's larkspur	Plant	Sensitive
6	*Dodecatheon frenchii*	French's shooting star	Plant	Sensitive
5	*Eriocaulon koernickianum*	Small-headed pipewort	Plant	Sensitive
6	*Silene ovata*	Ovate-leaf catchfly	Plant	Sensitive
6	*Tradescantia ozarkana*	Ozark spiderwort	Plant	Sensitive
6	*Valerianella nuttallii*	Nutall's cornsalad	Plant	Sensitive

The occurrence analysis results table (above) shows one mammal species (gray bat) and three plant species (Ozark chinquapin, Southern lady's slipper and small-headed pipewort) were identified within the analysis area (OAR code "5").

Twelve species were not seen during field surveys, but possibly occur in the analysis area based on habitat observed or the field surveys were conducted when the species is not recognizable (OAR code"6"); 1 bird species (bald eagle), 3 mammal species (Ozark big-eared bat, Indiana bat and Eastern small-footed bat), 1 isopod species (Lirceus isopod), and 5 plant species (Ouachita leadplant, Bush's poppymallow, Moore's larkspur, French's shooting star, ovate-leaf catchfly, Ozark spiderwort, and Nuttall's cornsalad).

The occurrence analysis results table shows three aquatic species (longnose darter, William's crayfish and Nearctic paduniellan caddisfly) with occurrences or potential habitat known or suspected downstream of project/activity area but outside of identified geographic bounds of water resource cumulative effects analysis area - defined as a point below which sediment amounts are immeasurable and insignificant (OAR code "7").

Direct, Indirect & Cumulative Effects of Proposed Management Action on Each Identified Species

The analysis of possible effects to species identified as known or expected to occur in the vicinity of the proposed project, or likely to be affected by the action, includes the following existing information:

1. Data on species/habitat relationships.
2. Species range distribution.
3. Occurrences developed from past field surveys or field observations.
4. The amount, condition, and distribution of suitable habitat.

Effects to species include anticipated effects from implementation of the proposed action. Predicted effects to species shown in the table above are described in the Biological Evaluation for the Pea Prong project (Taylor, 2012).

Since completion of the biological evaluation (BE) for the Pea Prong project, an additional water quality analysis was completed for the project area (Monk, 2012). In completion of the BE for Pea Prong, two previous water quality analyses based on modeling developed for use on the Forest (Klingenpeel & Krump, 2005) and applied to all proposed management actions associated with the nearby Catalpa and Cougar project areas were utilized for determination of effects to aquatic resources from implementation of the Pea Prong project. The site specific water quality analysis for the Pea Prong project resulted in findings similar to those for the Catalpa and Cougar project areas. The cumulative effects analysis indicates minimal risks to the water resource's current condition. The activities proposed by the Forest Service for the proposed action will result in additional sediment production from the landscape, but from a watershed perspective, contribute only a small (if any) increase to the overall estimated sediment yield. The proposed alternative(s) results in a slight increase in the percentage of possible sediment contributions but results in no change in the concern level. Additionally, it should be possible to schedule these activities over time instead of instantaneously as predicted by the analysis, thus reducing the possibility of acute effects. Through the use of forest plan standards and the use of Arkansas Silviculture BMPs, the activities scheduled for implementation should not pose additional risks to water quality or designated uses (Monk, 2012).

Based upon the site specific water quality analysis for the Pea Prong project - the minor sediment increase from the alternatives are expected to be insignificant in comparison to the existing sediment load of the Mulberry River and its tributaries and will not have significant effect on habitat for fish or other aquatic life. There will be no negative direct, indirect or cumulative effects to aquatic species from implementation of management activities associated with this project proposal. No significant impacts (from loss of water quality) would result from implementation of this project that would push aquatic species closer towards federal listing under the Endangered Species Act, or cause loss of viability for these species. There are no foreseeable activities in the area that would directly or indirectly affect longnose darter, William's crayfish, and Nearctic paduniellan caddissfly or cause additive or synergistic adverse cumulative impacts in conjunction with the proposed action or alternatives. Therefore there will be no negative direct, indirect or cumulative effects to these species as a whole from management activities associated with this project.

Individuals of the species *Lirceus bicuspicatus* (lirceus isopod) may be directly impacted in upland areas away from the Mulberry River and its tributaries. Effects to individuals in these locations would be from direct physical disturbance. However, the proposed actions are not likely to cause a trend to federal listing under the Endangered Species Act and won't cause a loss of viability for this species. There are no foreseeable activities in the area that would indirectly affect the lirceus isopod in a negative manner or cause additive or synergistic adverse cumulative impacts to this species. Therefore, there will be no negative direct,

indirect or cumulative effects to this species as a whole from management activities associated with this project.

Determination of Effects – "No Action" Alternative (TES species)

No negative adverse effects would occur to federally listed (T & E) species populations (Ozark big-eared bat, gray bat and Indiana bat). Potential positive effects to these species through habitat improvement would not occur.

No negative adverse effects would occur to Region 8 sensitive species (longnose darter, bald eagle, Eastern small-footed bat, lirceus isopod, Williams' crayfish, Nearctic paduniellan caddisfly, Ouachita leadplant, Bush's poppymallow, Ozark chinquapin, Southern lady's slipper, Moore's larkspur, French's shooting star, small-headed pipewort, ovate leaf catchfly, Ozark spiderwort and Nuttall's cornsalad). Potential positive effects to species which require open (unshaded) and/or fire-dependent habitats would not occur. These sensitive species include Ouachita leadplant, Bush's poppymallow, Ozark chinquapin, Moore's larkspur, small-headed pipewort, Ozark spiderwort and Nuttall's cornsalad.

Determination of Effects –Alternatives 2 and 3 (TES species)

Ozark big-eared bat

The proposed action and action alternatives were all designed to totally incorporate all Forest-wide standards, and direction provided by the USFWS related to the conservation of all listed bat species.

With implementation of Forest-wide standards from the Revised LRMP which were developed in coordination with the USFWS during the revision process, the determination of effect for the Ozark big-eared bat related to this proposed project is: "may affect – not likely to adversely affect."

Gray bat

With implementation of Forest-wide standards from the Revised LRMP which were developed in coordination with the USFWS during the revision process, the determination of effect for the Gray bat related to this proposed project is: "may affect – not likely to adversely affect."

Indiana bat

There are no foreseeable, additional activities in the area (not associated with this project) that would directly or indirectly affect the Indiana bat, or cause additive or synergistic adverse cumulative impacts in conjunction with the proposed action.

With implementation of Forest-wide standards from the Revised LRMP which were developed in coordination with the USFWS during the revision process, the determination of effect for the Indiana bat related to this proposed project is: "may affect – not likely to adversely affect."

Implementation of this proposed project may benefit Ozark big-eared bat, gray bat and Indiana bat by providing habitat improvement.

Because there are no other threatened or endangered species or associated habitat present the proposed project will have no effect on any other listed or proposed species (Taylor, 2012).

Sensitive Species

For Region 8 sensitive species (longnose darter, bald eagle, Eastern small-footed bat, lirceus isopod, Williams' crayfish, Nearctic paduniellan caddisfly, Ouachita leadplant, Bush's poppymallow, Ozark chinquapin, Southern lady's slipper, Moore's larkspur, French's shooting star, small-headed pipewort, ovate leaf catchfly, Ozark spiderwort and Nuttall's cornsalad), direct negative impacts to individuals of these species may occur through implementation of the project. No negative indirect or cumulative impacts are expected for these species from implementation of the project. For sensitive aquatic species confined to the Mulberry River and its tributaries (longnose darter, Williams' crayfish and Nearctic paduniellan caddisfly), there will be no negative direct, indirect or cumulative impacts from implementation of the proposal. For all Region 8 sensitive species, implementation of the proposal will not lead to the federal listing of these species under the Endangered Species Act. Furthermore, there will be no loss of population viability for these species due to implementation of this project.

Implementation of this proposed project would indirectly benefit sensitive species which require open (unshaded) and/or fire-dependent habitats. These sensitive species include Ouachita leadplant, Bush's poppymallow, Ozark chinquapin, Moore's larkspur, Ozark spiderwort and Nuttall's cornsalad. Alternative 2 (no limit on prescribed burn size) is expected to be more beneficial to these sensitive species than implementation of Alternative 3 (burn size limited to 1,500 acres daily). Daily limitations on use of prescribed fire may inhibit the ability to introduce prescribed fire throughout the project area. Because there were no other sensitive species or habitat for such species present, the project will have no impact on any other Southern Region sensitive species (Taylor, 2012).

11. Human Health Factors

Existing Condition

At the present time, on National Forest Land, there are no risks to human health from the use of herbicides, manual/mechanical vegetation treatments, or prescribed fire in the project area. There is a risk of wildfire in the project area which potentially could affect human health factors. There are other human health risks for forest workers and visitors, primarily dead, dying or aging trees that create risk to human health from falling material. Falling trees and limbs on public lands can cause injury to National Forest visitors and can cause damage to personal property. Furthermore, portions of the project have areas affected by ice storm and wind damage. Forest fuel accumulations and the interspersion of private lands/property within the analysis area, in combination, lead to the potential for negative effects to human health and property from wildfire.

Direct, Indirect and Cumulative Effects

Alternative 1

There would be no change from the existing condition regarding risks to worker health from the use of herbicides, manual/mechanical vegetation treatments or prescribed fire. Risks to

human health and safety from falling limbs and trees associated with oak decline and storm damage would increase due to rot, decay, and wind-throw.

Potential accidents to workers completing manual/mechanical vegetation treatments and prescribed fire would be less with implementation of alternative 1.

Without the use of prescribed burning, the chances of a large wildfire would increase over time. In areas of moderate to heavy fuel accumlations it is more likely that a wildfire would result in severe fire intensity, thus eliciting more adverse effects than the slight- to moderate-intensity fire associated with intentional prescribed burning. Therefore, potential negative impacts to public human health would be greater with implementation of alternative 1.

Alternatives 2 and 3

There is a perception by the public that any use of herbicides on the Forest is unsafe. Herbicide is used in accordance with Forest-Wide Standards as described in the Revised Land and Resource Management Plan and in accordance with herbicide label requirements. The routine adherence to these standards and requirements minimizes potential risk to human health and the environment. Syracuse Environmental Research Associates, Inc. (SERA) Risk Assessments for herbicides evaluate imazapyr, triclopyr, imazapic, hexazinone, and glyphosate from a human safety viewpoint, evaluating risks, short term effects and cumulative effects. All information contained in these Herbicide Risk Assessments (RA's) is incorporated by reference into this analysis (Refer to Herbicide Section). Risk assessments for these chemicals are documented in the project analysis file. Risk to the public from herbicide use is low and this is mitigated by use of Forest-Wide standards and compliance with herbicide label requirements. The primary risk regarding herbicide use is related to herbicide applicators (either Forest Service employees or contractors). With proper handling/transport of herbicides, proper application equipment and methods and use of required protective personal equipment (PPE), risk of herbicide use to workers is mitigated.

There is a risk of worker injury during the completion of manual/mechanical vegetation treatments, and prescribed fire. Proper use of PPE, adherence to job hazard analyses and safety practices mitigate this risk. Risk to the public from these types of work is minimal. Risk of potential herbicide exposure to the public and application workers would be reduced with the implementation of Alternative 3, since less acres would be treated with herbicide. However, with proper handling/transport methods, use of signing in application areas (where required), use of proper application methods and equipment, and use of required PPE, risk of herbicide exposure to workers and the public is mitigated with implementation of Alternative 2.

Removal of dead and/or aging trees through harvest and thinning operations will make the forest safer for forest visitors, through reducing the incidence of falling snags and limbs.

Use of prescribed burning will lessen potential wildland fire occurrence, wildland fire severity and unplanned smoke emissions. Strict adherence to FEIS and LMRP guidelines, a site-specific burning plan and Arkansas Voluntary Smoke Management Guidelines will limit the area where EPA standards are exceeded to a location very close in proximity to the flaming front. Site-specific burn plans, and Arkansas Voluntary Smoke Management Guidelines ensure that smoke or other combustion products do not reach, or significantly

affect, smoke-sensitive areas. Smoke monitoring during and after prescribed burns will be conducted to determine compliance with smoke management guidelines, and for potential future mitigation required for downwind smoke sensitive areas. These actions will ensure that the requirements of the Clean Air Act, EPA air standards, and state requirements will be met and there should be no smoke-related long-term or cumulative effects from implementation of prescribed fire.

Downwind effects of reduced air quality would be short-term in nature. Impacting large population centers would be avoided. The acres burned under the alternatives 2 and 3 would occur over several days. Individual ignitions would generally be limited to 500 to 2,500 acres daily. Ignition of the project area would be spread over several days, and probably over multiple seasons and/or years – thereby reducing potential for smoke impacts. Use of aerial ignition would serve to reduce burn-out time and associated duration of smoke impacts. Aerial ignition would also help develop smoke-column lifting and reduce smoke impacts.

Smoke concentrations from prescribed burning can be a very serious matter, particularly near homes of people with respiratory illnesses, or near health-care facilities, or on roadways. Human health effects related to particulate matter in smoke include aggravation of respiratory or cardiovascular illnesses and changes in lung function, structure, and immunity capability of the body. Site-specific burn guidelines and compliance with Arkansas Voluntary Smoke Management Guidelines provide daily smoke/particulate matter emissions, smoke sensitive targets to avoid, and mitigation required to limit negative effects of burning on human health and safety to the extent possible. The Forest Service complies with all applicable Federal and State regulations governing open burning. Additionally, adjacent private landowners, and known members of the public with respiratory health issues are notified before prescribed fires are ignited. If concerns related to human health exist, the USFS will accommodate that citizen in an effort to provide a safe and healthy environment during the burn. (e.g., citizens with respiratory health issues will be given the option to stay in a hotel room provided by the USFS)

When implementing prescribed fire, all precautions are taken to avoid damage to private property and minimize risk to worker and public health as per site-specific burn plans, smoke management guidelines, standard fire safety guidelines and job hazard analyses.

Short-term potential impacts from smoke would be similar with either implementation of alternative 2 or alternative 3 (reduced daily burn size). However, potential impacts from smoke could occur on a total of approximately 1-2 days with implementation of alternative 2 and increase to 3-4 days with implementation of alternative 3.

Based upon the analysis, there should be no significant long-term cumulative effects on Human Health from implementation of herbicide use, manual/mechanical vegetation treatments, or prescribed fire associated with alternatives 2 or 3. For additional information regarding smoke emissions from prescribed fire, refer to the “Air Resources” section of this EA.

12. Social and Economic Factors

Existing Condition

The project is located in rural northwest Arkansas. The income levels are primarily moderate to low, and many local residents derive their income from harvesting timber and/or processing timber products. Local communities benefit from the taxes generated by timber activities. These benefits include social services such as law enforcement activities, safe drinking water, road maintenance/construction/reconstruction, and public school systems. These services contribute to an enhanced standard of living to the public within the area.

On October 30, 2000, congress signed into law the "Secure Rural School and Community Self-Determination Act of 2000" commonly known as Payments to States (Public Law 110-343). The Act addressed the decline in revenue from timber harvests in the last several years on Federal land, which has historically been shared with counties. These funds have been used by counties for schools, roads, and emergency activities.

On July 6, 2012, the Secure Rural Schools and community Self Determination Act of 2000 was reauthorized as part of Public Law 112-141. This allows counties to choose either 25% of the state's 7-year rolling average, or to receive a share of the state payment using a "formula" that uses several factors such as acres of Federal Land, previous payments, and per capita personal income. Counties must make an election by September 30, 2012.

Direct and Indirect Effects

Alternative 1

This alternative proposes no timber management activities. Therefore, there would be no economic benefits to the local communities resulting from jobs created by timber sales or money to be used for wildlife habitat needs (KV money).

Alternatives 2 &3

Activities proposed would affect the local economy by supplying timber for local mills, employing loggers to harvest timber, employing people to do site preparation, TSI/PCT, and wildlife habitat improvement work.

The revenues derived from the selling price of timber would contribute to school and road funds in Johnson and Madison County, in accordance with PL 112-141. At the time of the Pea Prong project economic analysis, hardwood sawtimber sold for $41.38/CCF, hardwood pulpwood sold for $2.82/CCF, pine sawtimber sold for $59.74/CCF, and pine pulpwood sold for $21.92/CCF. These figures reflect an average from several timber sales recently sold on the Ozark National Forest. Table 9 lists the Present Net Value of implementing Alternatives 2 & 3.

Table 9. Economic Report on the forest product revenues generated by Alternatives 2 & 3.

	No Action; Alternative 1	Alternatives 2 & 3
Timber Volume (CCF)	0	16,346
PV Timber Revenue	$0.00	$714,611

Due to budget constraints and changes, and current market values, the costs associated with projects being implemented several years out may change somewhat and would always need to be reviewed and weighed accordingly. Therefore, before this project is implemented, all costs for the proposed project would be re-evaluated and the project would be implemented only if the revenue/cost ratio is beneficial to the government.

Cumulative Effects

The action alternatives have a positive effect on the local economy in that it would provide revenue to the counties/schools and provide for local jobs. Economic benefits would also be realized through creation/improvement of wildlife & fisheries habitat and associated improvement to the OHT. Benefits to the public would be realized through reduction of fire hazard and potential loss/damage to personal property through implementation of fuels reduction burning. Reduction in fuel loading would serve to reduce potential wildfire spread and severity, thereby reducing costs associated with fire suppression which far exceeds costs per acre for prescribed burning. Decommissioning and closure of roads would create social benefits by reducing erosion and sedimentation. This would also serve to reduce the proliferation of illegal OHV use.

13. Management Areas, Scenery Management and Recreation

Existing Condition

Recreation
The project area is classified as "Roaded Natural" or "Semi Primitive Motorized" in the Recreation Opportunity Spectrum (ROS) designations.

ROS is a method for classifying types of recreation experiences available, or for specifying recreation experience objectives desired in certain areas. Classes are Primitive, Semi-Primitive Non-Motorized, Semi-Primitive Motorized, Roaded Natural, Rural, and Urban.

Roaded Natural is defined as an area characterized by predominantly natural-appearing environments with moderate evidences of the sights and sounds of man. Such evidences usually harmonize with the natural environment. Interaction between users may be low to moderate, but with evidence of other users prevalent. Resource modification and utilization practices are evident, but harmonize with the natural environment. Conventional motorized use is provided for in construction standards and design of facilities. The recreation opportunity experience level provided would be characterized by the probability for equal experiencing of affiliation with individuals and groups and for isolation from sights and sounds of humans. Opportunities for both motorized and non-motorized forms of recreation

Resource modification and utilization practices are evident, but harmonize with the natural environment. Conventional motorized use is provided for in construction standards and design of facilities.

Semi Primitive Motorized settings are characterized by naturally-appearing environment. Concentration of users is low. Resource modification and utilization practices are evident, but harmonize with the natural environment. Conventional motorized use is provided for in construction standards and design of facilities.

Recreation use in and around the analysis area is low to moderate, with highest use periods during the spring, early summer and fall seasons. Use consists of hiking, fishing, camping, picnicking, sightseeing, hunting, mountain bicycling, and OHV driving. The analysis area has several scattered dispersed recreation use sites.

Recreation visitors for hunting mostly utilize the dispersed campsites within the analysis area. OHV's and pick-up trucks are driven or brought from either private lands or other forestlands outside this project area to these areas primarily to ride roads for sightseeing and/or hunting. Dispersed camping and hunting of deer, turkey, and squirrel are common in the analysis area.

Off Highway Vehicles

OHV use is now restricted to Forest designated roads and trails. High-use areas are managed within capacities in order to maintain the quality of experiences. Facilities that provide access to the OHV system are created in conjunction with the development of the overall OHV system. Recreational OHV visitors are informed where designated routes are, what types of vehicles are allowed, and what seasons they are allowed.

Currently, there is a designated OHV route in the Pea Prong project area. It is a loop route consisting of roads 1540, 94461A & B, and 94462A & B. These roads will be used to access harvest areas. Signs will be posted during timber activities notifying OHV users to avoid this area.

Aesthetics and Management Area's

Scenery Management

The Forest Plan states that the desired condition for scenery management as: the biological, physical, and cultural features of landscapes that provide for a "sense of place" as defined in the Landscape Character descriptions are intact. Landscapes possess a vegetation pattern and species mix that is natural in appearance. Built elements and landscape alterations complement the lines, forms, colors, and textures found in the landscape. Fifty-percent of projects undertaken on the Ozark-St. Francis National Forests within High Scenic Integrity Objective (SIO) areas will attain a high SIO, 65% of projects undertaken in Moderate SIO areas will attain Moderate SIO rating, and 100% of projects located in Low SIO areas will attain that rating.

Definitions of Scenic Integrity Objectives:

Very High **VH:** (Unaltered-Preservation) Scenic integrity refers to landscapes where the valued landscape character "**is**" intact with only minute if any deviations. The existing landscape character and sense of place is expressed at the highest possible level.

High **H:** (Appears Unaltered-Retention) Scenic integrity refers to landscapes where the valued landscape character "**appears**" intact. Deviations may be present but must repeat the form, line, color, texture, and pattern common to the landscape character so completely and at such scale that they are not evident.

Moderate **M:** (Slightly Altered-Partial Retention) Scenic integrity refers to landscapes where the valued landscape character "**appears slightly altered**." Noticeable deviations must remain visually subordinate to the landscape character being viewed.

Low **L:** (Moderately Altered-Modification) Scenic integrity refers to landscapes where the valued landscape character "**appears moderately altered**." Deviations begin to dominate the valued landscape character being viewed but they borrow valued attributes such as size, shape, edge effect and pattern of natural openings, vegetative type changes, or architectural styles outside the landscape being viewed. They should not only appear as valued character outside the landscape being viewed, but also compatible or complimentary to the character within.

The majority of the project area has a SIO of Low or Moderate. The areas of SIO of High are concentrated around Pea Prong Creek and a small portion of Friley Creek.

The project area has visual diversity, with several areas of private ownership across the proposed project area, which consists of homes, weekend cabins, pasture for livestock, crops and private forested areas. Viewing from state highways, county roads and other primary forest roads consists mostly of steep mountains with mixed hardwoods, some pine on ridge-tops and drainages, and some areas of open pasture land.

Ozark Highlands National Scenic Trail

Ozark Highlands Trail Management activities are applied in ways that maintain appropriate conditions for wildlife habitat, soil productivity, water quality, recreational opportunity, and scenic beauty.

The Ozark Highlands Trail (OHT) Corridor includes approximately 6,175 acres and is 165 miles long running from Fort Smith State Park to the Buffalo River. This trail is designated as a National Recreation trail. This is the only National Recreation Trail on the Ozark-St Francis National Forests. Management practices are designed to protect the OHT experience; provide opportunities for high-quality outdoor recreation experiences and provide for the conservation and enjoyment of the nationally-significant scenic, historic, natural, and cultural qualities of the land though which the OHT passes.

In the project area, the Ozark Highlands National Recreation trail (OHT) runs through the southern section of the project area in T12N R25W Sections 9, 15, and 16. The OHT corridor width is 198 feet on either side of the centerline of the trail center and was established to provide visual enhancement, protect the trail and minimize maintenance by keeping a canopy over the trail. This management area retains a natural, forested or pastoral appearance shaped by both natural processes and humans. Management practices are modified to recognize the nationally-significant aesthetic and recreational values of these lands. This area is classified as unsuitable for timber production; however, low-intensity vegetation management is appropriate to maintain the long-term goals and stewardship objectives of the OHT. However, there are no plans of activity within the corridor in the Pea Prong project.

The Ozarks Highland Trail is the only National Recreation Area within the vicinity of the proposed actions.

Direct, Indirect and Cumulative Effects

Alternative 1

Aesthetics and Management Areas

There would be few short-term changes; however, as ecosystems in the analysis area progress, hardwoods would be expected to be an increasing component in the areas now dominated by pine, and hardwood stands would be expected to progress toward containing a greater component of shade-tolerant, fire-intolerant species. Visual color and pattern diversity, especially during leaf-off, would decrease with less of the contrasting green-gray patchwork patterns. Neither the ROS nor the SIO designations will be changed under this alternative.

The No Action alternative would not allow management areas to move toward their desired future conditions.

Recreation and OHV Use

This alternative will not change the recreation use (OHV driving, camping, hiking, mountain bicycling, or fishing) in the project vicinity.

Dispersed camping and hunting will be affected in the long term under this alternative. Alternative 1 provides no activities that maintain or increase habitat on public lands. Successful viewing of game and non-game species and hunting of deer and turkey could decrease on public lands under this alternative with possible increased use of private lands. Squirrel hunting will improve as the hardwood stands age.

Alternative 2

Aesthetics and Management Area's

Drivers and forest users along state highways, county, and forest roads will notice more browning of vegetation from harvest, herbicide and burning activities during the initial work and for the first season.

Timber harvesting in the forest would allow views that penetrate into the stands, allowing views further than the existing near foreground, giving the stands a more park-like appearance and providing for a greater diversity of understory species. Tree removal will be varied in the near foreground to avoid uniform spacing and a tree-farm appearance. Slash clean-up in certain areas or prescribed fire (which would greatly reduce slash) in the first 200-300 feet in areas seen from travelways and concentrated use areas should be completed.

Visitors to all areas of the proposed project area may also smell and see smoke during burning and blackened trees and ground for the first season until the next spring green-up, some browning of vegetation from harvest activities during the initial work and, for the first season, in stands along county and forest roads. They may also notice an increase in log truck traffic during the logging operations, but will continue to see a diverse landscape in the area. In the background, National Forest land will continue to offer viewers a variety of forest types from pines to hardwoods.

All of the proposed actions are consistent with the Forest Plan's Scenery management and desired conditions and no long-term adverse effects should occur.

Recreation and OHV Use

Recreation users in the area may smell and see smoke during prescribed burning and browning of vegetation from harvest, herbicide and burning activities during the initial work and for the first season. During prescribed burning and timber harvesting activities, area closures will be implemented to improve visitor safety. At the conclusion of the harvest activities and prescribed burning, certain roads will be closed, blocked and seeded. These activities will have no long-term negative effects on the dispersed recreation activities except with the use of closures on user-created trails.

Recreation users may notice signs saying, "This road is temporarily open for logging activities and will be closed to vehicle use when logging is completed." These signs will be placed on all currently closed roads, which will be reopened for this project and then reclosed after project completion by seeding the roadbed, gates and/or other closure structures. Roads closed with gates or earthen mounds will allow foot travel for hunters to access more secluded hunting spots. Roads that are closed can be used by hikers to access the interior of the project area. Reclosing roads will reduce the number of miles of roads on which users can drive motorized vehicles. Due to the implementation of the motor vehicle use policy, Vehicles are allowed to drive only on designated routes within the project area. Forest-wide designated motorized use routes will be managed to maintain a high-quality experience.

The proposed timber harvests and wildlife activities will improve hunting opportunities around the dispersed hunter camps and adjacent private lands. Planned vegetation treatments would improve wildlife viewing and hunting opportunities.

OHV users will be inconvenienced only for a few weeks while harvesting proceeds. The route should be improved by road maintenance measures during and after timber activities.

Hunters are frequently drawn to logged areas because of visibility; deer are attracted to them also. Early seral-stage vegetation will increase in the commercially-harvested areas, areas of wildlife stand improvement and wildlife openings. The TSI, woodland thinning, and burning

areas will also attract them. The placement of wildlife openings and areas restored to woodland condition will tend to attract animals to under-utilized areas on National Forest lands and, thereby increase hunting opportunities.

Campers at dispersed sites will notice logging traffic, hear chainsaws, and will see stands as they are being logged and other timber-related and wildlife improvement activities. Campers may see some short-term effects from other activities such as brown leaves in the prescribed burned and herbicide-treated areas, and areas where TSI/PCT work has been conducted. After the green-up of more beneficial ground vegetation, the opportunity of successful wildlife sightings and viewing may improve.

Maintaining a system of roads in the project area will allow outdoor enthusiasts to continue to enjoy the forest on foot and allow hikers access to areas for dispersed camping and hunting. Timber harvests, silvicultural treatments, riparian enhancements, and wildlife habitat improvements proposed in the action alternative should increase numbers of both game and non-game species, so the recreational use in the form of wildlife viewing and hunting should improve.

This alternative will not change non-consumptive recreation use (camping, hiking, and mountain bicycling,) in the project vicinity. Implementation of alternatives 2 or 3 would affect/reduce unauthorized OHV use in the area. User-created OHV trails would be reduced through planned road decommissioning and closure of roads.

Based on the analysis, there is nothing in Alternative 2 that would significantly affect any attributes which might make all or part of the vicinity suitable for proposal as a special interest area for dispersed recreation or scenic quality. This alternative complies with the revised Forest Land and Resources Management Plan.

Ozark Highlands National Scenic Trail

During prescribed burning, area closures will be implemented to improve visitor safety. This may temporarily delay thru hikers. Potential closures will be addressed in the burn plan for this area of the Ozark Highlands trail. Maintenance of the Ozark Highlands trail and the Lick Branch Trailhead may be possible through grant dollars with this alternative(s).

Alternative 3

The effects for Alternative 3 would be the same as the effects for Alternative 2 with the exception of herbicide application. Drivers and forest users along county and forest roads may have more occasions to notice browning of vegetation from repeated mechanical or handwork to replace some of the herbicide activities. Repeat hand treatments may be necessary to obtain the same effect that foliar herbicide, in combination with burning, would accomplish. Additionally, there would be an increase in seeing crews and equipment to accomplish the work that is normally completed with the use of broadcast herbicide. Lack of foliar herbicide use would not allow the levels of quality wildlife habitat to be created as would be expected with implementation of alternative 2.

Part 4 – Consultation and Coordination

The Forest Service consulted the following individuals, Federal, State, and local agencies, tribes and non-Forest Service persons during the development of this environmental assessment:

ID TEAM MEMBERS:

Name	Position	Office
James Bicknell	Special Uses/Lands	Pleasant Hill Ranger District
Mary Brennan	Zone Archaeologist	Pleasant Hill/Boston Mountain Ranger Districts
Tom Cravens	Forester/NEPA Coordinator	Pleasant Hill Ranger District
Robert Duggan	Recreation Specialist	Ozark-St. Francis National Forests, Supervisor's Office, Russellville, AR
Jeremy Eubanks	Timber Management Assistant	Pleasant Hill Ranger District
Pat Kowalewycz	District Ranger	Pleasant Hill Ranger District
Dan Martin	Fire Management Officer	Pleasant Hill Ranger District
Greg Taylor	Wildlife Biologist	Pleasant Hill Ranger District
Len Weeks	Forest Soil Scientist	Ozark-St. Francis National Forests, Supervisor's Office, Russellville, AR
Rick Arnold	Engineering Technician	Pleasant Hill Ranger District
Rick Monk	Forest Hydrologist	Ozark-St. Francis National Forests, Supervisor's Office, Russellville, AR
Dylan Farnam	Timber Sales Administrator	Pleasant Hill Ranger District

FEDERAL, STATE, AND LOCAL AGENCIES:

Name	Position	Office
Margaret Harney	Fish & Wildlife Biologist	U.S. Fish and Wildlife Service, Conway, Arkansas
Various Persons	Deputy State Historic Preservation Officer	Department of Arkansas Heritage
Terry Caston	Engineering Technician	Ozark-St. Francis National Forests, Supervisor's Office, Russellville, AR

NATIVE AMERICAN TRIBES/NATIONS:

Name	Location
Caddo Indian Tribe of Oklahoma	Binger, Oklahoma
Cherokee Nation of Oklahoma	Tahlequah, Oklahoma
Osage Nation	Pawhuska, Oklahoma
Quapaw Tribe of Oklahoma	Quapaw, Oklahoma
Tunica-Biloxi Tribe of Louisiana	Marksville, Louisiana
United Keetoowah Band of Cherokee Indians	Tahlequah, Oklahoma
Jena Band of the Choctaw Indians	Jena, Louisiana

Part 5 – Appendices

APPENDIX A
Forest Neighbors List (Adjacent Landowners)

Acord, Billy Ray, etal., Clarksville, AR
Acord, Elbridge A., Winston-Salem, NC
Acord, Charley Don, Ozark, AR
Andrews Oil & Gas Partnership, Port Washington, NY
Autenrieth, Randal E. & Patricia, Lake Jackson, TX
Baker, Elizabeth, Fayetteville, AR
Banderas Minerals, LLC., Tulsa, OK
Beauchamp, H.G., etal., Hartman, AR
Belt, Charles R., Fayetteville, AR
Benson, H.D. etal., Clarksville, AR
Birkhahn, Jerry & Mary, Lamar, AR
Bridges, Don or Barbara, Clarksville, AR
Breeding, Christopher C., Pettigrew, AR
Bryant, Randall C., Wesley, AR
Bryant, Robert Neil, Winslow, AR
Burnside, Gaylen, Little Rock, AR
Campbell, Darrell, Van Buren, AR
Collins, Carl L., Ozark, AR
Craig, Michael E., Bentonville, AR
Dean, Duane, Bass, AR
Dozier, Robert L., Springdale, AR
Edgmon, Carolyn S., Elkins, AR
Gilbert, Homer, Pettigrew, AR
Gliedt, Roger & Dianne, Rogers, AR
Gregory, Melborn W., etal., Clarksville, AR
Gregory, Billy & Connie, Clarksville, AR
Gregory, Jimmy D., Pettigrew, AR
Harris, Angela, Inola, OK
Hayes, Bobby K., Calico Rock, AR
Henson, Roy G., Rogers, AR
Johnson, Tommy Joe, Pettigrew, AR
Kelly, Mitchell L., Huntsville, AR
Kitchen, Jeffery A. or Angela, Pettigrew, AR
Krueger, James R., Pettigrew, AR
LWPTGK, LLC, Fort Smith, AR
Martinez, Jesse C., Jr., Pettigrew, AR
Meinhardt/Parawon Corp., Mobile, AL
Morgan, Gertrude, Living Trust, Turner, OR
Moses, Escol & Sue, Pettigrew, AR
Neece, David A., Fort Smith, AR
Newkirk, Steven J., Houston, TX
Niehues, Leon, Huntsville, AR
Neumeier, Gerald A., Scranton, AR
Neumeier & Jacobs, Pea Ridge, AR
Owensco, LLC, % Mike Tucker, Huntsville, AR
Patton, Jason A., Lamar, AR
Phillips, Dana, Pettigrew, AR
Powell & Powell, Fayetteville, AR
Rusher & Holloway, Ozark, AR
Sammons, Paul, Bryant, AR
Seagull Midsouth, Inc., Oklahoma City, OK
Sewell, Patrick, Sr., etal., Cameron, LA
Shepperd, Bobby E., Fayetteville, AR
Sizemore, Brenda Kay, Pettigrew, AR
Smith, Mark, Fayetteville, AR
Smith & Williams, Pettigrew, AR
Smith, Marcia Dee Hudson, Pettigrew, AR
Smith, John D., Pettigrew, AR
Stepp, Artist, Pettigrew, AR
Stepp, J. Danny, etal., Cabot, AR
Storms, Gordon J., Lamar, AR
Stout, Jerry & Judy, Oark, AR
Stiritz, John & Mattye, Conway, AR
Strubel, Doug & Cathy, Pettigrew, AR
Stanphill, Roy or Sheryl, Rogers, AR
Stewart, R.V., North Little Rock, AR
Sonstegaard, Miles H., Fayetteville, AR
Silva Properties, LLC, Farmington, AR
Fort, Deborah, Rudy, AR
Freyaldenhoven, Bob, etal., Conway, AR
Gately, Susan, Rev. Trust, Ozark, AR
Grahuntley Properties, LLC, Jacksonville, AR
House, James L. & Nelva J., Springdale, AR
Diederich, Brian & Amy, Woodbine, GA
Deville, Anthony & Hilda, New Roads, LA
Lynch, Kevin, etal., Charleston, AR
Crumrine, James E., Clarksville, AR
Jones, Tammy, Ozark, AR
Rigsbee, Tom, etal., Rogers, AR
Miller, James II or Kathleen, Tontitown, AR
Martinez, Tammy, Pettigrew, AR
Marvel, Stanley Don & Betty Sue, Clarksville, AR
Rogers, Levon C., etal., Pettigrew, AR
Rogers, Keith, Springdale, AR
Osgood, Dan or Doreen, Kansasville, WI
Patterson, Ron G., Clarksville, AR
Teeter, Mark, Wynne, AR
Van Buren, Rex, Pettigrew, AR
Wiser, Grant, E., Clarksville, AR

Comments were received from:

1. Doug Strubel
2. Susan Gately (Friends of the Mulberry Watershed)
3. Jim Krueger
4. Bob Freyaldenhoven
5. Kevin Lynch
6. Roger Gliedt
7. Mark Smith

These comments were considered in the development of the issues and concerns section, and in other sections of this EA.

APPENDIX B

Interested Citizens List

Allen, Chris, Clarksville, AR
Boulden, Zen & Pam, Ozark, AR
Benny Bowers, Ark. Game & Fish Comm., Paris, AR
Deltic Timber Corp., Ola, AR
Eichenberger, Frank, Morrilton, AR
Free, Fran, Audubon Arkansas, Fayetteville, AR
Gainey, David & Claire, Clarksville, AR
Goodman, Sarah, Clarksville, AR
Hooks, Glen, Sierra Club, Little Rock, AR
Horn, Phillip, Clarksville, AR
Howard, Richard, Ozark, AR
Lacy, H. Miles, Green Bay Packaging, Morrilton, AR
McKinney, Tom, Sierra Club, West Fork, AR
Meers, Richard, Fort Smith, AR
Michelson, Mike, Ozone, AR
Newton County Wildlife Assn., Pettigrew, AR
Porter, Shawn, Ozark Society, Parthenon, AR
Travis Lumber Co., Mansfield, AR
Townsell, Bob, Conway, AR
Young, Kenn, Clarksville, AR

APPENDIX C – Forest Type and Condition Class Codes

Forest Types (first 2 digits of the 4 digit code-- **XX**xx)
(species listed by occurrence in stand)

11 - Eastern Red Cedar and Hardwood
12 - Shortleaf Pine and Oak
13 - Loblolly Pine and Oak
25 - Yellow Pine
31 - Loblolly Pine
32 - Shortleaf Pine
35 - Eastern Red Cedar
43 - Oak and Eastern Red Cedar
44 - Southern Red Oak and Yellow Pine
47 - White Oak, Black Oak and Yellow Pine
48 - Northern Red Oak, Hickory and Yellow Pine
49 - Bear Oak, Southern Scrub Oaks and Yellow Pine
51 - Post Oak and Black Oak
53 - White Oak, Red Oak and Hickory
54 - White Oak
55 - Northern Red Oak
63 - Sugarberry, American Elm and Green Ash
68 - Sweet Bay, Swamp Tupelo, Red Maple
69 - Beech, Magnolia
72 - River Birch and Sycamore

Stand Condition Class (last 2 digits of the 4 digit code--xx**XX**)
Even-aged Management Codes:
01 - In regeneration
02 - Damaged Poletimber
03 - Damaged Sawtimber
04 - Forest Pest Infestation
05 - Sparse Poletimber
06 - Sparse Sawtimber
07 - Low Quality Poletimber
08 - Low Quality Sawtimber
09 - Mature Poletimber
10 - Mature Sawtimber
11 - Immature Poletimber
12 - Immature Sawtimber
13 - Adequately Stocked Seedlings and Saplings
14 - Inadequately Stocked Seedlings and Saplings
15 - Non-stocked
0000 - Pastures or other Special use areas
Uneven-aged Management Codes:
16 - Group Selection Management (Hardwood)
17 - Individual Tree (Single-tree) Selection Management (Pine)

APPENDIX D - References
(Environmental Assessment and Biological Evaluation)

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